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Configuring Dial Services

NORTEL NETWORKS™

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Preface

This guide describes dial-on-demand, dial backup, and bandwidth-on-demand services and what you do to start and customize these dial services on a Nortel Networks™ router.

You can use the Bay Command Console (BCC™) or Site Manager to configure dial-on-demand and dial backup on a router. You use Site Manager to configure bandwidth-on-demand. In this guide, you will find instructions for using both the BCC and Site Manager.

Before You Begin

Before using this guide, you must complete the following procedures. For a new router:

- Install the router (see the installation guide that came with your router).
- Connect the router to the network and create a pilot configuration file (see *Quick-Starting Routers*, *Configuring BayStack Remote Access*, or *Connecting ASN Routers to a Network)*.

Make sure that you are running the latest version of Nortel Networks BayRS™ and Site Manager software. For information about upgrading BayRS and Site Manager, see the upgrading guide for your version of BayRS.

Text Conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is: **ping** <*ip_address*>, you enter: **ping 192.32.10.12**
bold text	Indicates command names and options and text that you need to enter. Example: Enter **show ip** {**alerts** | **routes**}. Example: Use the **dinfo** command.
braces ({})	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is: **show ip** {**alerts** | **routes**}, you must enter either: **show ip alerts** or **show ip routes**, but not both.
brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is: **show ip interfaces** [**-alerts**], you can enter either: **show ip interfaces** or **show ip interfaces -alerts**.
ellipsis points (. . .)	Indicate that you repeat the last element of the command as needed. Example: If the command syntax is: **ethernet/2/1** [<*parameter*> <*value*>] **. . .** , you enter **ethernet/2/1** and as many parameter-value pairs as needed.

italic text	Indicates file and directory names, new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is: **show at** <*valid_route*> *valid_route* is one variable and you substitute one value for it.
`screen text`	Indicates system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`
separator (>)	Shows menu paths. Example: Protocols > IP identifies the IP option on the Protocols menu.
vertical line (|)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is: **show ip** {**alerts** | **routes**}, you enter either: **show ip alerts** or **show ip routes**, but not both.

Acronyms

This guide uses the following acronyms:

ANI	Automatic Number Identification
ARP	Address Resolution Protocol
AURP	AppleTalk Update-based Routing Protocol
BACP	Bandwidth Allocation Control Protocol
BAP	Bandwidth Allocation Protocol
BofL	Breath of Life
BRI	basic rate interface
CHAP	Challenge Handshake Authentication Protocol
CRC	cyclic redundancy check
CSU	channel service unit
DLCI	data link connection identifier
DLCMI	data link control management interface
DSL	Digital Subscriber Loop
DSU	data service unit
ET	exchange terminator
HDLC	High-level Data Link Control
ICMP	Internet Control Message Protocol
IFTF	interframe time fill
IP	Internet Protocol
IPX	Internetwork Packet Exchange
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector (formerly CCITT)
LAN	local area network
LAPD	Link Access Procedure Digital
LCP	Link Control Protocol

LQR	Link Quality Report
LT	line terminator
MIB	management information base
MRU	maximum receive unit
NCP	Network Control Protocol
NT	network terminator
PAP	Password Authentication Protocol
PH	packet handling
PPP	Point-to-Point Protocol
PRI	primary rate interface
PSPDN	packet-switched Public Data Network
PSTN	public-switched telephone network
PVC	permanent virtual circuit
RADIUS	Remote Authentication Dial-In User Service
RIP	Routing Information Protocol
SAP	Service Advertising Protocol
SAPI	service access point identifier
SCC	serial communication controller
SPID	Service Profile Identifier
SVC	switched virtual circuit
TA	terminal adapter
TE	terminal equipment
TEI	terminal endpoint identifier
UNI	user-to-network interface
VSA	vendor-specific attribute
WAN	wide area network
XNS	Xerox Network System

Hard-Copy Technical Manuals

You can print selected technical manuals and release notes free, directly from the Internet. Go to *support.baynetworks.com/library/tpubs/*. Find the product for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Using Adobe Acrobat Reader, you can open the manuals and release notes, search for the sections you need, and print them on most standard printers. You can download Acrobat Reader free from the Adobe Systems Web site, *www.adobe.com*.

You can purchase selected documentation sets, CDs, and technical publications through the collateral catalog. The catalog is located on the World Wide Web at *support.baynetworks.com/catalog.html* and is divided into sections arranged alphabetically:

- The “CD ROMs” section lists available CDs.
- The “Guides/Books” section lists books on technical topics.
- The “Technical Manuals” section lists available printed documentation sets.

How to Get Help

If you purchased a service contract for your Nortel Networks product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Nortel Networks service program, contact one of the following Nortel Networks Technical Solutions Centers:

Technical Solutions Center	Telephone Number
Billerica, MA	800-2LANWAN (800-252-6926)
Santa Clara, CA	800-2LANWAN (800-252-6926)
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5402-7041

Chapter 1
Dial Services Overview

A *dial service* connects remote users through a central switched network to other destinations on the network using dial-up lines (also called *switched lines*). Dial-up lines are temporary connections that a router activates when there is data to send across the network, when a failed connection needs a backup connection, or when a congested leased line needs an additional connection for more bandwidth.

For remote users such as people in branch offices, telecommuters, and sales people in the field, dial-up lines can be a cost-effective alternative to leased lines and packet networks, which are permanent connections that are available regardless of network traffic.

Nortel Networks offers three dial services: dial-on-demand, dial backup, and bandwidth-on-demand. This chapter includes the following information:

Topic	Page
How to Use This Guide	1-2
Nortel Networks Dial Services	1-3
Dial-on-Demand Service	1-5
Dial Backup Service	1-14
Bandwidth-on-Demand Service	1-22
Using the Same Line for All Dial Services	1-27

Chapters 5 through 8 describe the Nortel Networks implementation of each dial service.

How to Use This Guide

This guide is organized as follows:

- Overview of each dial service.

  If you are new to Nortel Networks dial services, begin with this chapter. If not, go to one of the starting chapters.

- Starting chapters, which explain how to set up a basic configuration using all of the defaults.

  Go to Chapter 2 to start any dial service using Site Manager, the graphical user interface network management tool. Go to Chapter 3 to start dial-on-demand or dial backup service using the Bay Command Console (BCC), the command-line interface configuration tool.

- Chapters describing features specific to each dial service.

  Read Chapters 5, 6, 7, and 8 to learn about the Nortel Networks implementation of dial service features.

- Instructions for modifying the default configuration that you set up based on the instructions in Chapter 2 or 3.

  To customize a dial service configuration, see Chapters 9 through 16. Most of the instructions assume that you created an initial configuration as described in Chapter 2 or 3.

- Appendixes for Site Manager parameter descriptions, configuration examples, BCC **show** commands, ISDN ordering information, and a list of AT modem initialization commands.

The names of the dial services are sometimes abbreviated in this guide. Table 1-1 lists the full and abbreviated names of each dial service.

Table 1-1. Dial Service Names

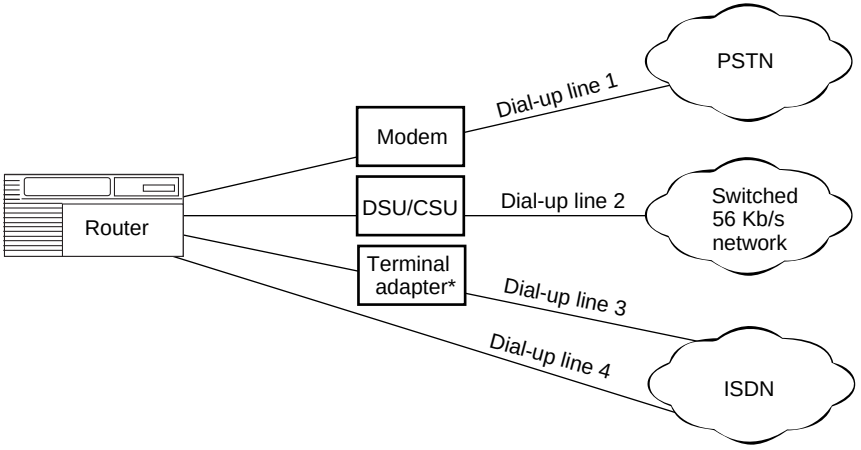
Full Name	Abbreviated Name
Dial-on-demand	Demand
Dial backup	Backup
Bandwidth-on-demand	Bandwidth

Nortel Networks Dial Services

The router provides three types of dial services: dial-on-demand, dial backup, and bandwidth-on-demand. Each dial service serves a different purpose:

- **Dial-on-demand** service reduces your line costs by establishing a connection between two devices only when there is data to send. You do not incur the cost of a leased line that is active regardless of data traffic.
- **Dial backup** service provides a backup circuit when a leased circuit fails. The backup circuit serves as an alternative path for data to reach its destination.
- **Bandwidth-on-demand** service provides up to 29 additional B channels for a congested leased line, dial-on-demand line, or leased multilink bundle. This provides a total of 30 B channels for communication. The additional lines increase bandwidth for data traffic, improving communication and reducing network delays.

All three dial services work over public-switched telephone networks (PSTNs) such as a standard telephone network, a switched 56 Kb/s network, and an Integrated Services Digital Network (ISDN) (Figure 1-1).



*You only need a terminal adapter if your router does not have built-in ISDN capability. If your router has an ISDN BRI module or an MCT1 or MCE1 link module installed, along with ISDN software, you can connect to an ISDN network directly.

DS0005A

Figure 1-1. Example of Dial Access to a Switched Telephone Network

Network Access Methods and Services

The router initiates, monitors, and terminates dial-up connections using a modem or ISDN terminal adapter that supports Raise DTR, V.25bis, or Hayes signaling, or a router with a built-in ISDN interface connected directly to an ISDN network. If the router has internal ISDN capability, you do not need external dial devices.

Note: For Basic Rate Interface (BRI) service, you need a network terminator 1 (NT1) to connect to an ISDN network. The router's ISDN/BRI adapter module does not include an internal NT1, so you or your service provider must supply it.

For the ARN™, the ISDN/BRI S/T adapter module does not have an NT1, so you or your service provider must supply it. The ARN ISDN/BRI U adapter module has the NT1 built in.

All three dial services can access a switched network using the following methods:

- **Integrated ISDN capability** -- Provides a BRI or Primary Rate Interface (PRI) for digital connectivity from the router to the destination device, replacing standard analog phone lines. Using signals on an ISDN line, the router instructs the network to set up a call to a particular destination. ISDN capability eliminates the need for dial devices such as modems, because you no longer need to convert digital signals to analog. An ISDN network also allows you to send data, voice, and video over the same digital line.
- **Raise DTR** -- A signaling method that enables access to the network by preprogramming the destination phone numbers into the dial device (modem or ISDN terminal adapter). Raise DTR signaling works with the following interfaces: X.21, V.35, RS-232, and RS-422.
- **V.25bis** -- A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device (modem or ISDN terminal adapter). This method lets the dial device support connections to multiple destinations. V.25bis signaling works with the following interfaces: X.21, V.35, RS-232, and RS-422.
- **Hayes** -- A signaling method that enables network access by passing the destination phone numbers from the router to the dial device (modem or ISDN terminal adapter). Using Hayes signaling, the router sends an AT initialization command to interact with the dial device. The ARN internal V.34 modem uses Hayes signaling.

The method you choose depends on your application, network resources, and the type of network to which you are connecting. ISDN, a complex networking technology, is further explained in Chapter 4.

Dial-on-Demand Service

Dial-on-demand service enables you to establish a network connection only when the router has data to send across the network, or when you dynamically configure the router to establish a connection. By using dial-up lines, you significantly reduce the high costs associated with leased lines, which connect remote locations even if there is no data to transmit or receive.

Activating Demand Circuits

To implement dial-on-demand, the router establishes a demand circuit. The router activates a demand circuit when:

- The router has data to send across the circuit.

  When the router has data to transmit, it automatically selects one of the demand lines from the circuit's associated demand pool. As long as data is going across the line, the end-to-end connection remains active.

- You enable the Force Dial parameter, which instructs the router to force a connection.

  To activate a line immediately, you configure the Force Dial parameter to force the router to initiate a connection, regardless of whether there is data activity. To configure this parameter, see "Forcing the Circuit to Activate or Deactivate" on page 12-8.

- You specify a time of day to activate the circuit.

  Using the Schedule option, you can schedule the circuit's availability for a specific day and time. The schedule parameters are part of the circuit's configuration (see "Scheduling Demand Circuit Availability" on page 12-37). The Schedule option also allows you to specify whether the router uses the Inactivity Timeout parameter to dynamically deactivate the connection.

The router does not accept incoming calls or activate frame relay demand circuits if there is an incoming call from the frame relay network. The router answers an incoming call only over a PPP circuit.

The frame relay switch does not activate PVCs and configured DLCIs until the router receives data from the demand circuit and exchanges data link control management interface (DLCMI) status messages with the switch. For more information about frame relay, see *Configuring Frame Relay Services*.

Terminating Demand Circuits

The router deactivates the demand circuit when:

- You enable the Force Take Down parameter, which instructs the router to force the termination of a connection.

  To deactivate a force dial connection, you configure the Force Take Down parameter, which instructs the router to clear the connection. To learn how to configure this parameter, refer to Chapter 12.

- You schedule the circuit to come down.

  Using the Schedule option, you can schedule the circuit's availability for a specific day and time. The schedule parameters are part of the circuit's configuration (refer to Chapter 12). The Schedule option also allows you to configure whether the router uses the Inactivity Time parameter to dynamically deactivate the connection.

- The inactivity timer expires.

  To deactivate the connection, you can configure the Inactivity Time parameter, which dynamically terminates the connection after a specified amount of time elapses without data activity. If there is data going across the line, the inactivity timer resets and the connection remains active.

  To ensure that a connection is not up longer than necessary, you can configure traffic filters that allow specific types of data to go across a line without resetting the inactivity time.

  For PPP connections, the router does not consider Link Quality Report (LQR), Link Control Protocol (LCP), and periodic CHAP messages as data, so these messages do not reset the inactivity timer.

  For frame relay circuits, DLCMI messages and other signaling packets are not treated as data, so they do not reset the inactivity timer. The router usually terminates frame relay demand connections, not the frame relay network.

- The frame relay DLCMI fails.

  If the DLCMI messages cannot be exchanged across the frame relay demand circuit, the router deactivates the circuit.

Dial-on-demand is supported on asynchronous (RS-449), synchronous (RS-449, V.35, RS-422, and X.21), and ISDN interfaces. Figure 1-2 shows a demand line connecting two routers. When the router has data to transmit or when you configure the router to bring up a demand circuit, the router instructs the dial device to establish a connection.

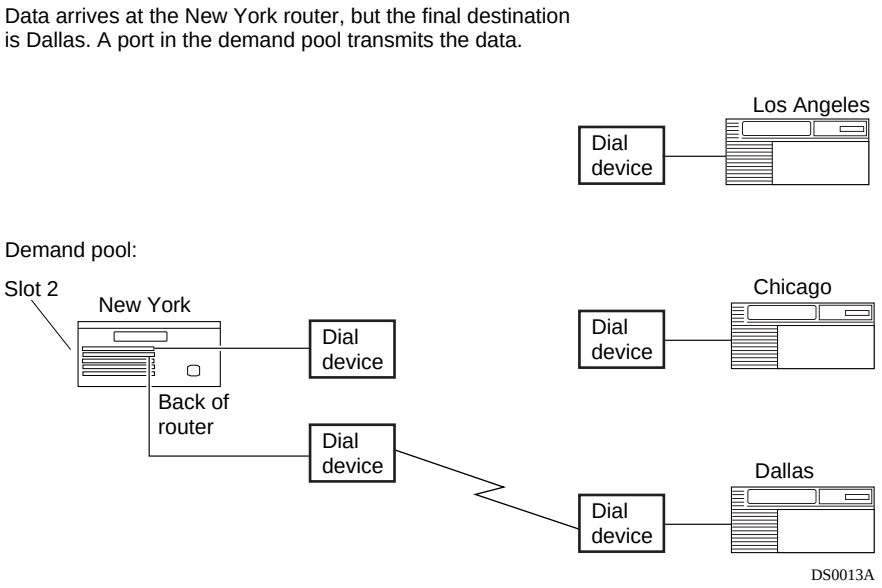


Figure 1-2. Dial-on-Demand Service

Demand Lines and Pools

Demand lines provide the physical connections over which the demand circuits transmit and receive data. To maximize the number of circuits that can be active simultaneously, you establish a *demand pool.*

A demand pool is a group of one or more lines that reside in the same slot on the router. You identify each demand pool by assigning a *demand pool ID*. Lines in a demand pool can connect to a modem, directly to a PSTN (using the ARN with the V.34 Modem Adapter Module), or directly to an ISDN network (using a router with internal ISDN capability).

You can combine asynchronous, synchronous, and ISDN interfaces in a single pool. The synchronous interfaces can use Raise DTR or V.25bis signaling for modem connections. The asynchronous interfaces can use Raise DTR, V.25bis, or Hayes signaling for modem connections. Hayes signaling requires that you use AT modem commands to send dialing instructions to the modem. The ISDN lines use ISDN signaling for network connections.

How Demand Lines, Pools, and Circuits Work Together

When you create demand circuits, you assign a demand pool ID to each circuit. Note that many demand circuits can use the same demand pool and, therefore, can use the same lines in that pool. The line itself does not have a specific network address; it is the circuit that has the associated network address.

When the router has data to send across a demand circuit, the circuit searches for an available demand line from its associated demand pool. When it finds an available line, the router establishes a dial-up connection to the remote router. The router terminates the connection when there is no more data to send or receive, when you manually take down the connection, or when the scheduled time for an active connection expires.

Figure 1-3 shows the relationship between demand lines, pools, and circuits using PPP as the data link layer protocol.

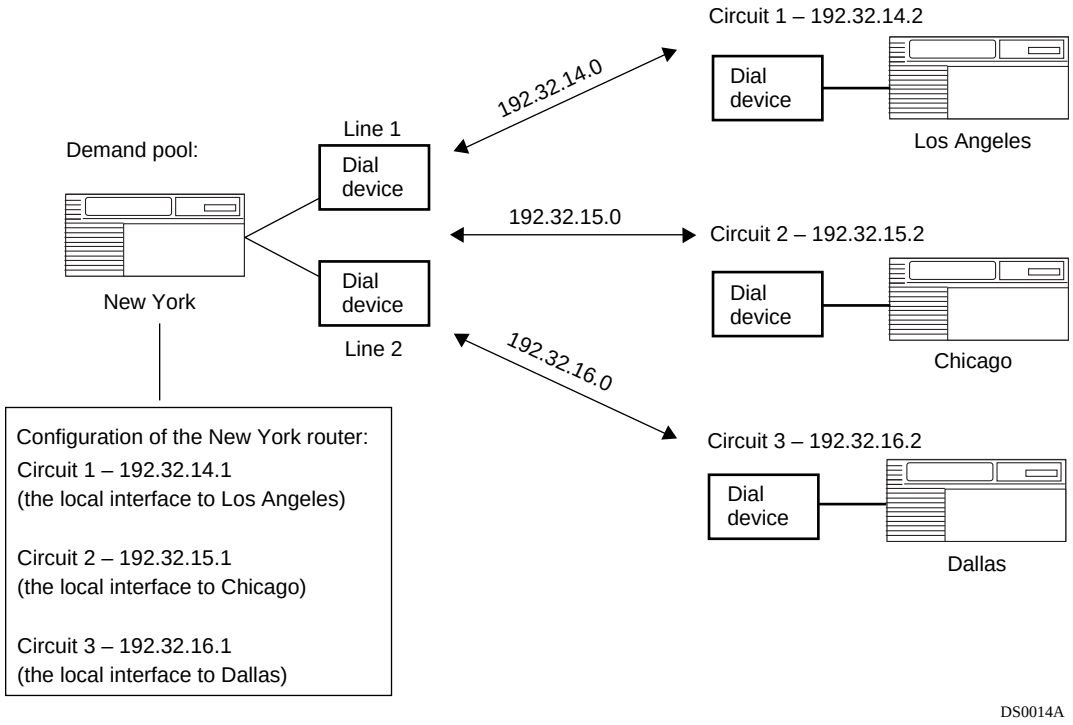


Figure 1-3. Example of Demand Lines, Pools, and Circuits

In Figure 1-3, three circuits share two physical lines that make up demand pool 1. Note that only two of the circuits using demand pool 1 can be active simultaneously because only two modems are available. The IP addresses are associated with each circuit, not with the physical line.

In addition to assigning a demand pool ID to each circuit, you can assign protocol interfaces and configure phone lists for use with V.25bis, Hayes, and ISDN signaling. For more information, see Chapter 15, “Customizing Phone Lists.”

Demand Circuit Protocols

The protocol for a demand circuit can be either PPP or frame relay. A frame relay demand circuit can have any number of service records and PVCs. Typically, frame relay connections are used with ISDN lines. PPP and frame relay circuits can use the same demand pool.

Figure 1-3 on page 1-9 shows an example of a PPP demand circuit over modem lines; Figure 1-4 shows a frame relay demand circuit over ISDN lines.

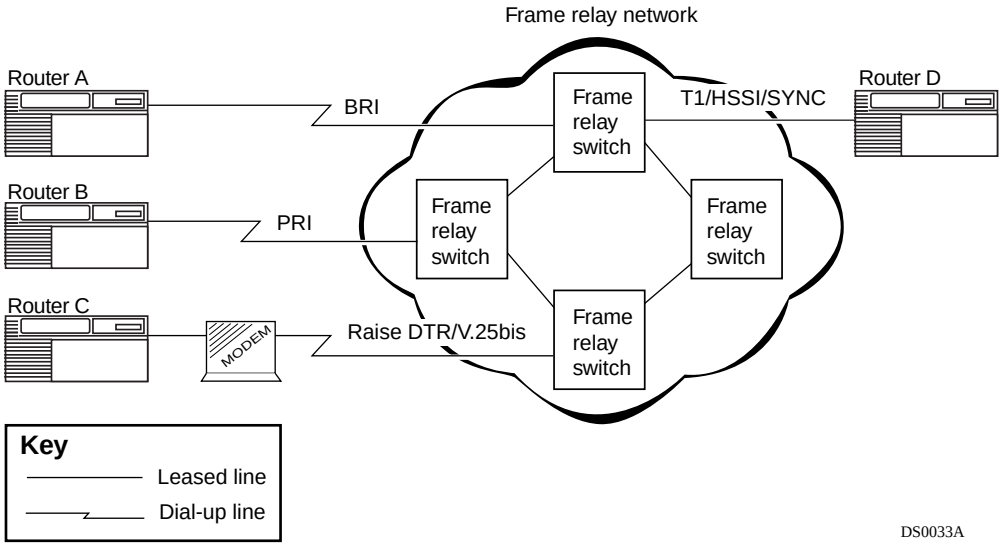


Figure 1-4. Dial-on-Demand Connection over a Frame Relay Network

In Figure 1-4, remote routers A, B, and C are connecting to the central router D through a frame relay network, dialing into the network across ISDN lines. Router D connects to the network across a leased line.

The permanent virtual circuits (PVCs) in this network can be either fully meshed or non-fully meshed, allowing routers A, B, C, and D to connect to one another. With the dial connection between the routers and the frame relay network, each router can dial into the network and communicate with another router, provided that the PVCs are set up properly and that the physical and logical connections are active. Frame relay demand circuits cannot answer incoming calls. They can only dial into a frame relay network, that is, they can place outbound calls.

Configuring Frame Relay to Work Optimally with Dial-on-Demand

How frame relay demand circuits operate depends on how your frame relay service provider defines the user-to-network interface (UNI), the point between the router and the service provider site. The service provider defines the UNI *dynamically* or *statically.*

If the UNI is dynamic, it changes for each call. This means that the PVCs may be different for each call, but they direct data to the same destination. The router initially learns the PVCs when it calls the frame relay switch. If the UNI is static, the user has defined the PVCs and can configure them for the router. The UNI remains the same for all calls.

For a frame relay demand configuration to work well, follow these guidelines:

- You must have a PVC configured *before* you place a call.

  For data to activate a demand circuit (instead of using Force Dial), the router must learn at least one PVC from the frame relay switch before it can place a call. However, to learn the PVCs, the router must call the switch, which it cannot do.

  For a dynamic UNI, you need to statically configure at least one PVC on the router that is not configured for the switch. The static PVC acts as a “fake” PVC that the router uses only to place an initial call to the switch. To configure a static PVC, you set the frame relay data link connection identifier (DLCI) to a number other than the number the switch provider assigns, assuming you know the range of possible DLCIs. The static PVC is still valid if you happen to use a number that the switch provider uses. For information about configuring PVCs, see *Configuring Frame Relay Services.*

  For a static UNI, the user configures the PVCs. A “fake” PVC is unnecessary.

- For a dynamic UNI, use the default frame relay service record. This service record holds all PVCs that the router learns dynamically.

- Choose a network layer protocol that can retransmit data between the PVC and the network if the data is lost.

  Although the router makes a dial connection and starts sending data, the PVCs do not always activate immediately. Consequently, you might lose data during the first part of the transmission. Therefore, it is important to use protocols that can account for this situation and ensure that any lost data can be sent again. We strongly recommend using the Internet Protocol (IP) or the Internetwork Packet Exchange (IPX).

- If the remote routers in your network are using IP, ensure that they also use the Address Resolution Protocol (ARP) and not Inverse ARP. This enables the local router to learn address information.

Adding Bandwidth Service for Congested Demand Lines

To relieve congestion across a demand line, you can use up to 29 additional lines from an existing bandwidth-on-demand pool, providing a total of 30 lines for communication. This feature is only for demand configurations that use PPP as the data link layer protocol. Adding bandwidth to a congested demand line benefits time-critical applications that require data to reach its destination efficiently.

To provide more bandwidth for a demand circuit, you associate the demand circuit with a bandwidth-on-demand pool, then you configure parameters that monitor congestion across the line.

After you enable bandwidth-on-demand service, the router determines that the demand line is congested when the traffic over the line exceeds a certain user-configured threshold. The router that is configured as the congestion monitor then searches for an available line from the bandwidth pool that you associate with this demand circuit.

Lines in a bandwidth-on-demand pool can reside across slots, so you need to designate each slot as either *preferred* or *reserved*. This determines the order in which the router searches the slots for available lines; the preferred slot is first and the reserved slot is second. If these slots have no available lines, the router automatically uses the *local* slot. The local slot is the slot containing the first demand line that was activated. When the router activates additional lines, they adopt the configuration of the congested demand circuit.

PPP multilink is the protocol that enables the router to use multiple lines simultaneously to transmit data. Multilink enables the router to use lines at different speeds and to evenly distribute data across those lines. When you enable multilink, you can configure a set of links between two peers into a single *bundle*. The actual number of lines in a multilink bundle depends on hardware platform constraints, total bundle speed, the speed of each link in the bundle, and the type of traffic you are sending.

For PPP demand connections across ISDN lines, you can manage the allocation of bandwidth for a multilink bundle by enabling the PPP Bandwidth Allocation Protocol (BAP). This protocol is available only after bandwidth service is set up. For more information about BAP, see Chapter 8, “Bandwidth-on-Demand Implementation Notes.”

Figure 1-5 illustrates how additional switched lines provide more bandwidth for a congested demand line.

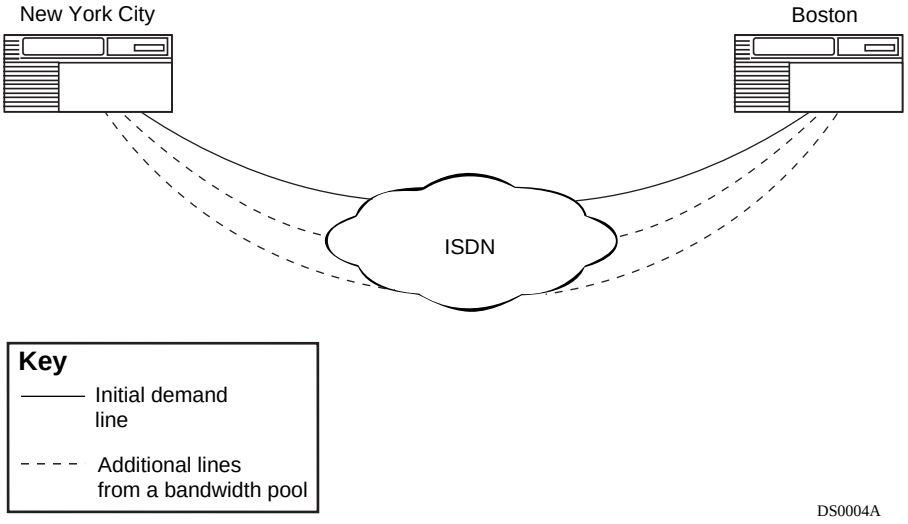


Figure 1-5. Additional Lines for a Dial-on-Demand Connection

Dial Backup Service

Dial backup service provides alternate paths between the same two routers for data to reach its destination if the primary line fails.

A *primary line* is a leased line, a leased multiline (Standard and PPP only), or a leased multilink connection. This leased line acts as the physical connection over which the leased circuit (the logical connection) carries traffic. You designate these leased circuits as *primary circuits*, which instructs the router to provide backup service if the primary line and circuit fail.

If a primary circuit fails and you configured dial backup service for that circuit, the router activates an available backup line. When the primary circuit is restored, the router reroutes all traffic from the backup circuit to the primary circuit and clears the dial backup connection.

Dial backup is supported on asynchronous lines (RS-449), synchronous lines (RS-449, V.35, RS-422, and X.21), and ISDN interfaces.

Table 1-2 lists the primary and backup lines that you can configure.

Table 1-2. Primary and Backup Lines

Line	Type
Primary	Any leased line up to T1/E1 rates, including multiline (Standard and PPP only) and multilink connections. Frame relay multiline circuits and L2TP circuits cannot be dial backup primaries.
	Frame relay PVCs
Backup	Any WAN line including ISDN B channels. Lines must be in the dial backup pool.

Table 1-3 lists the protocols for each type of primary and backup circuit.

Table 1-3. Primary and Backup Circuit Protocols

If the primary circuit's protocol is	The backup circuit's protocol can be
Standard	Async or Sync PPP
PPP	Async or Sync PPP
Frame relay -- backing up a service record with only one PVC (direct mode)	Async or Sync PPP
Frame relay -- backing up the entire frame relay interface (group mode)	Frame relay only

Activating the Backup Line

When the router detects a failure on the primary line, it selects a line from a backup pool. The router activates a backup line when:

- The primary circuit is not operating.
- All of the primary circuit's lines have failed.
- An active backup line has failed.

  If the backup line itself fails, an inactive backup line can replace it only if you configure multiple lines in the backup pool. If the first line fails for every phone number in the router's phone list, and the primary line is still down, the router tries the next line in the pool.

  If you are backing up a frame relay primary circuit, the router (not the network) activates and terminates the frame relay backup connection. The router rejects incoming calls from the frame relay network.

Reestablishing the Backup Connection

If the remote site has several telephone lines attached to individual dial units, the backup circuit uses the telephone numbers stored in the primary circuit's record to connect to the site. If one telephone number fails, the backup line attempts to connect using one of the other telephone numbers.

For V.25bis calls, the router redials the same phone number until its retry attempts reach the maximum retry count that you specify in the modem parameters. If the router cannot make a connection using the current phone number, it tries the next number in its phone list. It continues trying until it has gone through all of the numbers or it connects successfully.

For ISDN calls, the router sends a call setup message for each number in the phone list. If the router cannot make a connection using the current phone number, it tries the next number in its phone list. It continues trying until it has tried all of the numbers or it connects successfully.

Terminating the Backup Connection

The router terminates the backup circuit after it restores the primary circuit, the backup circuit fails, or the configured time period for the backup circuit has expired. After the router restores the primary circuit, it verifies that the backup circuit is no longer active. If the backup is still active, the router terminates it.

Backup Circuit Protocols

When you select PPP or frame relay as the protocol for the backup circuit, you determine whether the router performs circuit backup or link backup.

Circuit backup is a point-to-point backup connection. One circuit is backed up at a time, instead of an entire interface. When you back up a point-to-point primary circuit (Standard, PPP, or a single frame relay PVC), the protocol for the backup circuit is PPP.

Figures 1-6 and 1-7 show examples of circuit backup. Figure 1-6 shows a Standard primary circuit aided by a PPP backup circuit. Figure 1-7 shows a PPP primary circuit aided by a PPP backup circuit.

Note: For circuit backup of a single frame relay PVC, the backup line passes through the PSTN network only, bypassing the frame relay network.

Note: If either primary line fails, the modem at
Central site A can connect to Router B or C via a backup circuit.

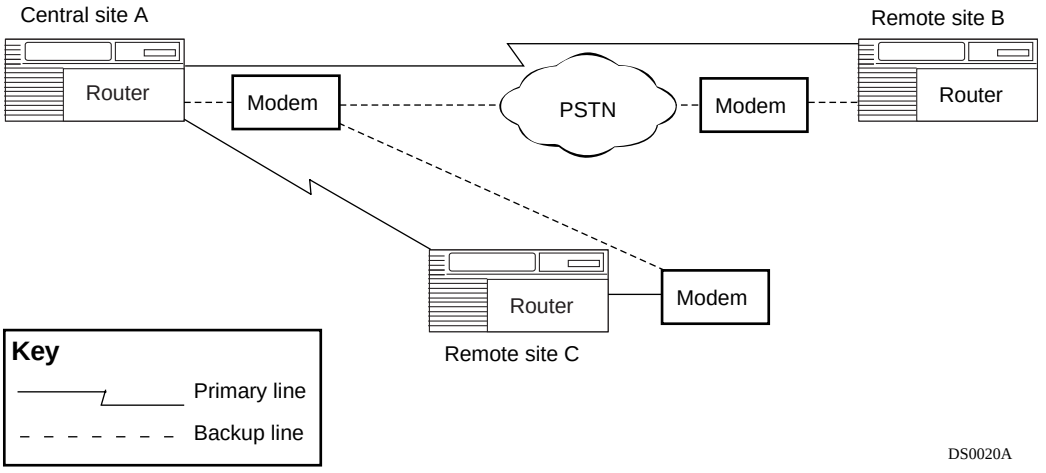


Figure 1-6. PPP Backup over a PSTN

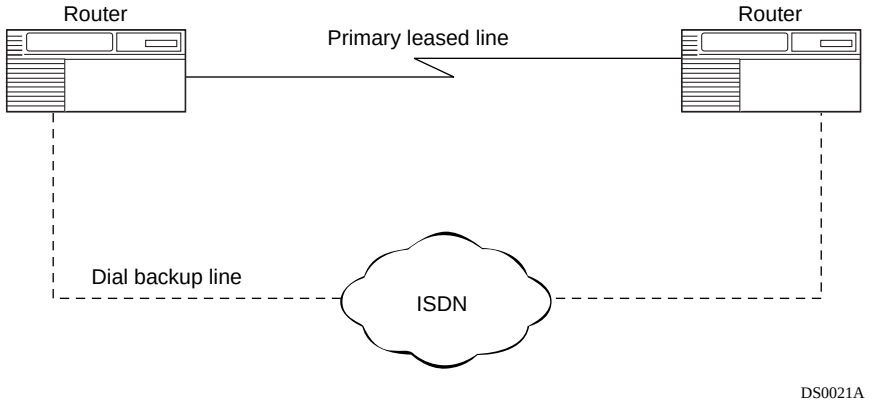


Figure 1-7. PPP Backup over an ISDN Network

Link backup is a multiple-circuit backup, which means that the entire interface is backed up. To back up all PVCs for a frame relay interface, you configure frame relay across the backup circuit.

Figure 1-8 shows an example of link backup.

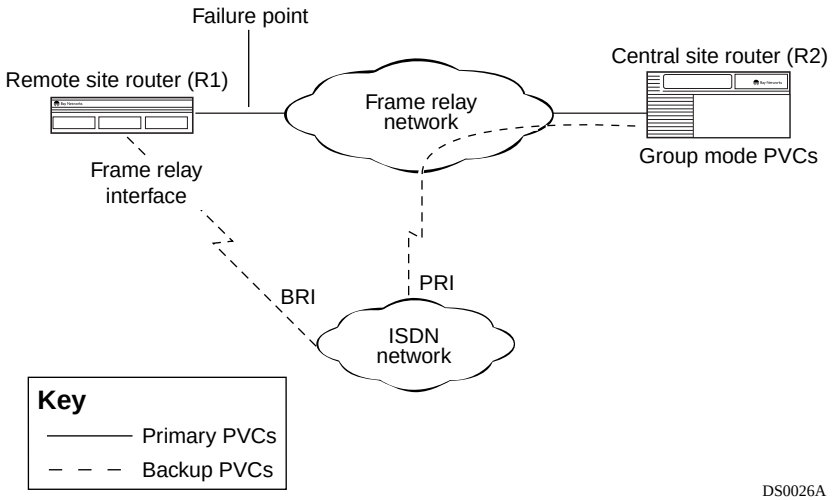


Figure 1-8. Link Backup for a Frame Relay Network

In Figure 1-8, if the frame relay link fails at router R1, the router activates a backup connection through the ISDN network, then back through the frame relay network to the destination. The backup connection to the frame relay network uses a different network interface and PVCs than the primary connection. After the primary line recovers and the frame relay switch responds to router R1's DLCMI status requests, router R1 terminates the backup connection.

Note: A primary circuit cannot use link and circuit backup simultaneously.

Knowing When the Primary Line Fails

Depending on the protocol for the primary and backup circuit, the router determines that the primary circuit failed in one of the following ways:

- No Breath of Life (BofL) messages in the BofL time period (Standard and PPP)

  For Standard and PPP, the router automatically enables BofL messages on each primary line and disables them on each backup line. BofL messages verify that the line is operational. The router determines that the primary line has failed when it stops receiving packets within the BofL time period.

  You can customize the BofL timer. For instructions, see *Configuring WAN Line Services*.

- No DLCMI messages (frame relay primary/frame relay backup)

  When frame relay is the protocol for the backup circuit, the router performs link backup. For link backup, the router knows that the primary failed when it no longer receives DLCMI messages from the switch. These messages communicate information about the interface and the status of each PVC.

  The router may also rely on modem signals to determine whether the primary circuit failed. If you rely on modem signals, you must enable the sync polling feature, which instructs the router to monitor modem signals. (See *Configuring WAN Line Services* for more information about the Sync Polling parameter.) In addition, you must use the proper synchronous cable to connect to the primary line's modem or CSU/DSU. See the *Cable Guide*.

- A-bit notification (single frame relay PVC primary/PPP backup)

  If only one frame relay PVC is being backed up by PPP, the router performs circuit backup. For circuit backup, the frame relay service provider must support A-bit notification, which tells the router the status of the PVC. This enables the router to back up the PVC if it fails. Without A-bit notification, the remote side of the PVC is never notified when the local side of the PVC has terminated, making dial backup service impossible.

Backup Lines and Pools

A backup line is an alternative line that carries data if the primary line fails. It is advantageous, therefore, to have one or more backup lines to ensure data transmission. To assign one or more backup lines to a primary line, you establish a *backup pool*.

A backup pool is a collection of lines that the primary circuits can use. Each backup pool is identified by a *backup pool ID*.

The lines in a backup pool can reside in any slot on a router that supports WAN lines; therefore, the pool can span multiple slots. Lines in a backup pool can connect to a modem, directly to a PSTN (using the ARN with the V.34 Modem Adapter Module), or directly to an ISDN network (using a router with internal ISDN capability).

You can combine asynchronous, synchronous, and ISDN interfaces in a single pool. The synchronous interfaces can use Raise DTR or V.25bis signaling for modem connections. The asynchronous interfaces can use Raise DTR, V.25bis, or Hayes signaling for modem connections. Hayes signaling requires that you use AT modem commands to send dialing instructions to the modem. The ISDN lines use ISDN signaling for network connections.

How Backup Lines, Pools, and Circuits Work Together

For each leased circuit that needs a backup circuit, you designate that circuit as a *primary circuit* and assign it a backup pool ID. If the primary circuit fails, the router activates the backup line to carry the backup circuit. If your network uses a multiline or multilink primary, the backup line is activated when the last line in the multiline or multilink bundle fails. You must first configure a leased circuit and a backup pool before you can configure backup circuits.

Figure 1-9 shows how backup lines, pools, and circuits work together. The router in San Diego has two leased lines, one going to a router in Phoenix and the other to a router in San Francisco. The circuits for each of these destinations are associated with backup pool 1. If either of these leased lines fails, the San Diego router activates backup line 1 from backup pool 1 to continue routing traffic to the destination.

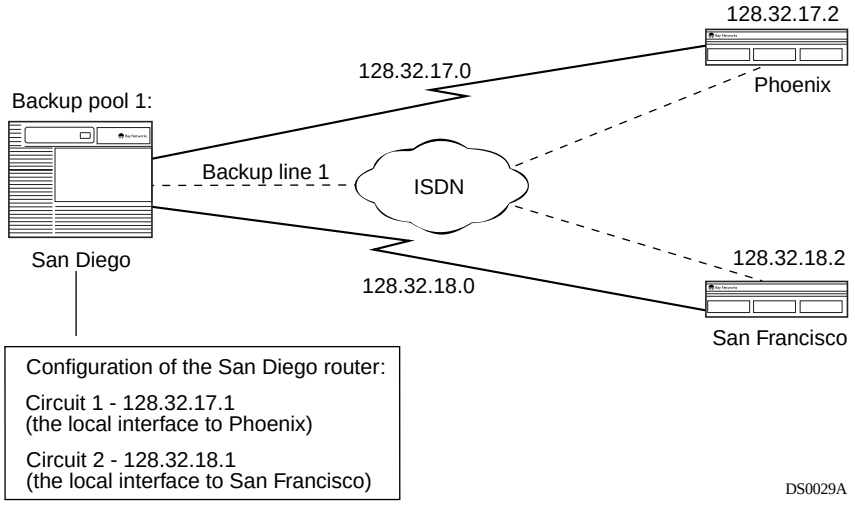


Figure 1-9. Example of Backup Pools, Lines, and Circuits

You can assign the same backup pool ID to more than one primary circuit. If you want only one backup line dedicated to a primary circuit, then you should configure only one line in a pool and assign that pool exclusively to that circuit.

Configuration of the Backup Circuit

The configuration of the backup circuit depends on the protocol for the primary circuit. If Standard or PPP is running over the primary circuit, the backup circuit inherits the primary's network layer address configuration. Unlike the network layer address configuration, the data link layer configuration can be unique.

If frame relay is running over the primary circuit, the backup circuit can inherit the primary's configuration or it can use its own configuration. When the frame relay primary and backup circuit use the same configuration, it is called the *shared configuration*. The shared configuration allows a backup circuit to use the same network layer address as the primary circuit. The backup circuit's data link layer configuration (PVCs, DLCIs, and filters) can be the same or different from the primary circuit.

If the backup circuit uses a unique configuration, it is called the *secondary configuration*. A secondary configuration uses a different network layer address and data link layer configuration (PVCs and filters) from the primary circuit.

Note: If the backup circuit connects to a different interface at the destination than the primary circuit, you do not need to configure unique PVCs for the backup circuit. In this case, the switch informs the destination router of the available PVCs.

Bandwidth-on-Demand Service

Bandwidth-on-demand service lets you configure additional dial-up lines for:

- A congested leased line
- A congested multilink bundle, which is a set of links between two peer routers
- A congested dial-on-demand line

Note: For information about adding bandwidth for demand lines, see "Adding Bandwidth Service for Congested Demand Lines" on page 1-12.

When data traffic exceeds the capacity of a line or bundle, bandwidth-on-demand service reduces congestion by adding up to 29 dial-up lines. The router can then provide a total of 30 lines for communication.

PPP multilink is the protocol that enables the router to use multiple dial-up lines simultaneously to transmit data. The actual number of lines in a multilink bundle depends on hardware platform constraints, total speed of the bundle, the speed of each link, and the type of traffic you are sending.

You can manage the allocation of bandwidth for a multilink bundle using the PPP BAP. This protocol is available only for ISDN lines; you configure it after you configure bandwidth-on-demand service. For more information about BAP, see Chapter 8, "Bandwidth-on-Demand Implementation Notes."

Enabling Bandwidth-on-Demand Service

The leased line, demand line, or leased multilink bundle is the physical connection over which the leased or demand circuit (the logical connection) carries traffic. The procedure for enabling bandwidth-on-demand service differs for leased circuits and demand circuits.

For a leased circuit, you designate the circuit as a *bandwidth-on-demand circuit.* This instructs the router to provide secondary dial-up lines if the leased circuit becomes congested.

For a demand circuit, the PPP Demand Circuits window includes a BW on Demand button that lets you associate the demand circuit with an existing bandwidth-on-demand pool. It also lets you configure bandwidth-on-demand monitor parameters that determine when the demand circuit is congested.

Bandwidth-on-demand service is supported on asynchronous lines (RS-449), synchronous lines (RS-449, V.35, RS-422, and X.21), and ISDN interfaces.

You can use the following types of lines and protocols for bandwidth-on-demand service:

- **Leased lines** -- A single leased line, a multilink bundle, a switched dial-on-demand line. Protocol supported: PPP multilink.
- **Secondary dial-up lines** -- Any WAN line. Protocols supported: asynchronous or synchronous PPP multilink, BAP for ISDN lines.

The leased lines and secondary dial-up lines may operate at different speeds.

Figure 1-10 shows how secondary lines support a leased connection.

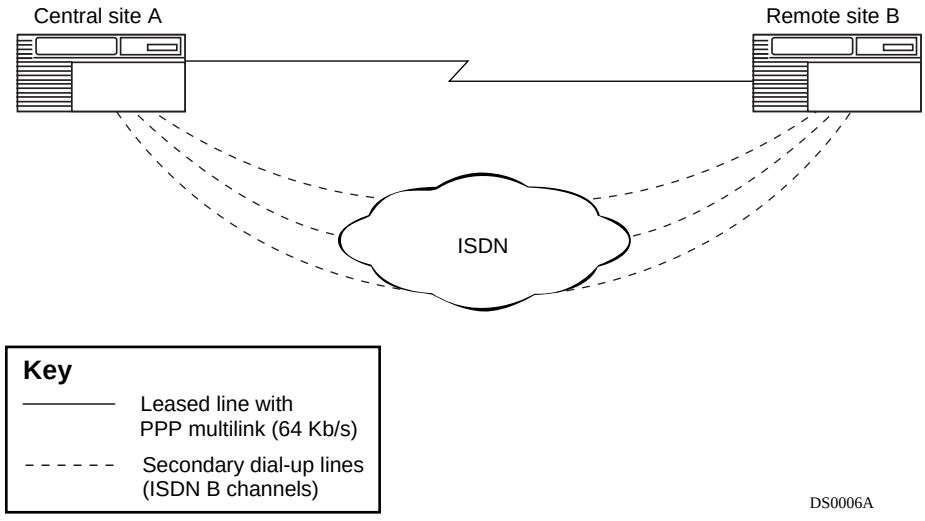


Figure 1-10. Example of Bandwidth-on-Demand Service

Initially, the router brings up one secondary line to alleviate congestion. If the congestion persists, the router activates a second and then a third line until the congestion subsides. Each new line that the router activates becomes part of a multilink bundle. The router then balances traffic over the bundle. After the traffic decreases, the router deactivates the secondary lines, one at a time.

A router on one side of the connection monitors byte counts for the data it sends and receives. This router is called the *monitor router*. The monitor router uses these byte counts, along with bandwidth-on-demand monitor parameters, to determine when to activate additional lines for more bandwidth. The router then uses all the available lines in the bundle to send data across the network.

The router on the other side of the connection is the *non-monitor* router. The non-monitor router cannot activate additional dial-up lines. If you configure BAP for ISDN connections, the non-monitor router has a more active role in determining how additional lines are activated for more bandwidth. For more information about BAP, see Chapter 8, “Bandwidth-on-Demand Implementation Notes.”

Activating Dial-Up Lines to Relieve Congestion

If one dial-up line from the bandwidth pool does not relieve the congestion, the router adds up to 29 lines until the congestion is relieved. The router activates additional lines only for a congested line, not for a failed line.

PPP multilink detects a state of congestion based on byte counts and the user-defined monitor parameters. (For routers running BayRS Version 12.10 or later, byte counts are measured after data compression.) The monitor parameters let you define congestion thresholds for the leased or demand circuit. If data traffic exceeds a threshold, the router tries to activate a dial-up line. At this point, if you configure BAP, it manages the addition and removal of lines from the multilink bundle, based on the monitor parameters. For more details about BAP, see Chapter 8, "Bandwidth-on-Demand Implementation Notes."

After the volume of traffic on the congested line falls below the congestion threshold, the router again uses only the leased line, demand line, or bundle. For details about the monitor parameters, see "Monitoring Congestion on the Bandwidth or Demand Circuit" on page 14-3.

Terminating Secondary Lines

The router terminates secondary lines when:

- The leased circuit is no longer congested.
- The leased line or multilink bundle fails.
- The remote router terminates the connection.
- There is a physical problem with the dial-up line.

Bandwidth-on-Demand Lines and Pools

A *bandwidth-on-demand pool* is a collection of dial-up lines that a congested leased line, demand line, or multilink bundle can use. Each bandwidth-on-demand pool is identified by a *bandwidth-on-demand pool ID*.

In a bandwidth-on-demand pool, you can combine asynchronous, synchronous, or ISDN lines in a single pool. Lines in a backup pool can connect to a modem, directly to a PSTN (using the ARN with the V.34 Modem Adapter Module), or directly to an ISDN network (using a router with internal ISDN capability).

You can combine asynchronous, synchronous, and ISDN interfaces in a single pool. The synchronous interfaces can use Raise DTR or V.25bis signaling for modem connections. The asynchronous interfaces can use Raise DTR, V.25bis, or Hayes signaling for modem connections. Hayes signaling requires that you use AT modem commands to send dialing instructions to the modem. The ISDN lines use ISDN signaling for network connections.

Lines in a bandwidth pool may operate at different speeds. PPP multilink, the protocol that the router uses for bandwidth-on-demand circuits, can manage lines of varying speed, distribute traffic across lines, and monitor traffic. The router may also use BAP to manage bandwidth allocation.

When a leased line or bundle becomes congested, the router searches for an available dial-up line from its associated bandwidth-on-demand pool. Lines in a bandwidth-on-demand pool can reside on any slot, but each secondary circuit can use only three slots.

To determine the order in which the router searches the slots, you designate each slot as *preferred* or *reserved*. The router uses the preferred slot first. If there are no available lines, the router uses the reserved slot. If there are still no available lines, the router automatically uses the *local* slot, which is the slot containing the first leased line that was activated. When the router finds a line, it dials the destination using a phone number from the user-configured outgoing phone list.

How Lines, Pools, and Circuits Work Together

You assign a bandwidth pool ID for each leased circuit or demand circuit. If the line or bundle becomes congested, the router activates a dial-up line from the pool. The dial-up circuit that runs over this line inherits the configuration and protocol characteristics of the leased circuit.

You can assign the same bandwidth pool ID to more than one circuit. If you want a pool of dial-up lines dedicated to a specific bandwidth circuit, assign the pool exclusively to that circuit. Remember to first configure a leased or demand connection before configuring bandwidth-on-demand service.

Sample Bandwidth-on-Demand Application

In Figure 1-11, the leased line is congested due to bridge/routing protocol traffic. The BLN® in Rome, designated as the monitor router, has determined that the line is congested based on the monitor parameter values. Consequently, the router brings up an ISDN B channel as a secondary line.

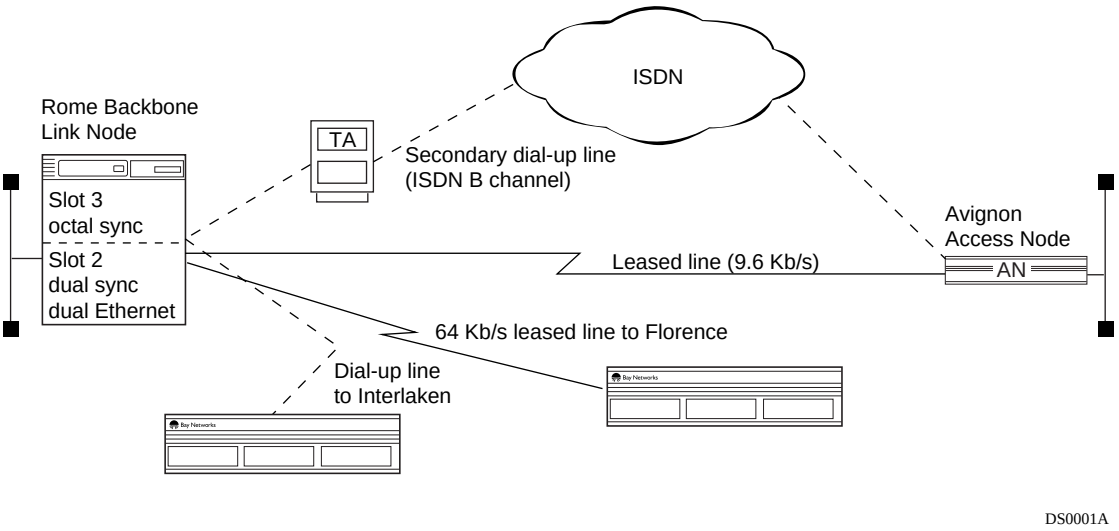


Figure 1-11. Sample Bandwidth-on-Demand Network

The monitor router brings down the secondary line when the level of congestion falls below the configured percentages. In addition to supporting the leased line to Avignon, the B channel can also act as a backup line for the leased line from Rome to Florence and as a demand line from Rome to Interlaken.

Using the Same Line for All Dial Services

You can use the same physical line for dial-on-demand, dial backup, and bandwidth-on-demand pools. For example, if the router is not using a line for a dial-on-demand connection, it can use the line for a dial backup connection. If there are several requests for the same line, the router uses the line for the service requested first.

Chapter 2
Starting Dial Services Using Site Manager

In this chapter, you will create a basic dial service configuration using Site Manager, that is, a configuration using all available defaults. Subsequent chapters explain how to customize the basic configuration to suit your needs.

This chapter includes the following information:

Topic	Page
Before You Begin	2-2
Setting Up a Dial Service	2-2
Configuring Line Pools	2-6
Configuring Circuits	2-14
Creating PPP Dial-on-Demand Circuits	2-15
Creating PPP Dial Backup Circuits	2-19
Creating Bandwidth Circuits	2-22
Creating an Outgoing Phone List	2-27
Creating the Local Phone List (ISDN Only)	2-28
Setting Up the Caller Resolution Table	2-30
What to Do Next	2-31

Before You Begin

Before you configure a dial service, do the following:

- Install the router.
- Install either ISDN or modem lines.
- Order ISDN service (if applicable) and receive the information for setting up ISDN configurations (for example, switch type and phone numbers). For information on ordering ISDN lines in the United States, see Appendix D, "Ordering ISDN Lines in the United States."
- Order and configure external modems (if applicable).
- Determine the Challenge Handshake Authentication Protocol (CHAP) names and secrets for routers making connections with the Point-to-Point Protocol (PPP).
- Open the configuration file you want to configure for dial services. For instructions, see *Configuring and Managing Routers with Site Manager.*

Setting Up a Dial Service

Each dial service has many configurable parameters, but for a basic configuration, you change only a subset of these parameters.

Setting up dial backup service involves the following main tasks:

1. Creating the leased interface that will use backup service (dial backup only).

   See *Configuring WAN Line Services* for instructions.
2. Creating line pools
3. Configuring circuits that use the configured line pools

Each task involves several steps, which are discussed later in this chapter.

Table 2-1 lists the basic tasks required to set up a dial service. These tasks apply to modem and ISDN configurations.

This basic configuration assumes the following:

- PPP is the layer 2 protocol.

  Site Manager automatically configures PPP on lines in a bandwidth pool. For lines in a demand or backup pool, PPP is not configured automatically; you must select it. PPP routes, or bridges, datagrams over point-to-point lines. Synchronous, asynchronous, and ISDN interfaces can all use PPP.

- IP is the layer 3 protocol.
- There is no ISDN caller ID service; therefore, no incoming phone list is required.

This basic configuration does not address every application. There are many other features and functions that you can configure. You can make these modifications in the customizing chapters.

Table 2-1. Setting Up a Default Modem or ISDN Configuration Using Site Manager

Task	Parameters to Set
1. For dial backup or bandwidth-on-demand service only, configure leased interfaces on a COM, MCT1, or MCE1 port. You will designate these leased interfaces as dial backup primaries or bandwidth circuits. Chapter 1 of this manual lists the types of leased lines that you can select. Do not do this for dial-on-demand service, even if you configure demand circuits to use bandwidth-on-demand service. **To use ISDN interfaces only as dial connections:** Select a port (ISDN, MCT1, or MCE1) that you want to include as an ISDN dial line in a line pool and configure it for BRI or PRI service.	See *Configuring WAN Line Services* for instructions on setting up leased interfaces. Port Application Mode
2. Create a line pool and assign it an ID.	Pool ID
3. Add one or more lines to the pool and, for modem lines, configure the interface. For ISDN lines, the interface is defined before adding the line to the pool.	Line Media Type WAN Serial Interface Type
4. Designate the ISDN switch type (ISDN only).	Switch Type
5. Specify a local phone number (ISDN only).	Directory Number
	Service Profile ID (SPID) (United States and Canada only)
6. Add a demand, backup, or bandwidth circuit.	Pool ID
7. Specify the leased-line connection type (backup and bandwidth only).	Circuit Type
	Backup Pool ID or Bandwidth-on-Demand Pool ID
8. Specify authentication protocol information (CHAP is the default protocol).	CHAP Local Name
	CHAP Secret
9. Specify the circuit connection mode.	Connection Mode (demand) Backup Mode (backup) Bandwidth Mode (bandwidth)
10. Add protocols. This chapter uses IP as an example (demand only).	IP Address
11. Create an outgoing phone list.	Outgoing Phone Number Outgoing Phone Ext/SubAddr
12. Set up the caller resolution table.	Caller Name CHAP Secret

To see a parameter description, click on Help in the Site Manager window or see Appendix A of this guide.

The menu from which you configure any dial service is the Dialup menu (Figure 2-1).

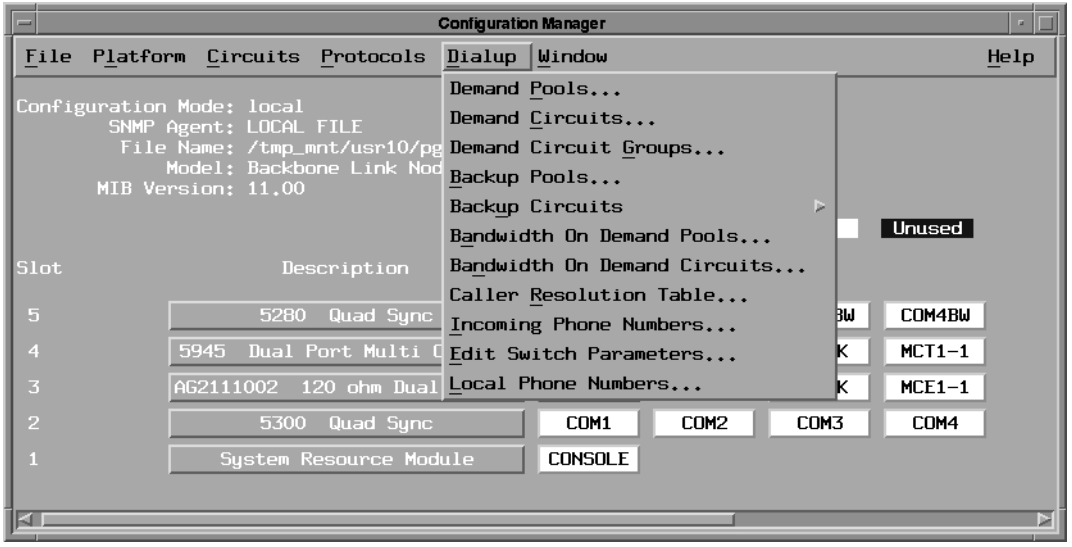


Figure 2-1. Dialup Menu in the Configuration Manager Window

Configuring Line Pools

A *line pool* is a group of one or more lines that reside on the router slots. You identify each pool by assigning a *pool ID*. The lines are the physical connections over which the circuits transmit and receive data. Each line can connect to a modem or directly to an ISDN network (using a router with internal ISDN or external terminal adapter). A line pool can have a combination of synchronous and asynchronous interface types.

The steps for creating line pools are the same for all three dial services. See the appropriate section for instructions:

- Creating Line Pools with Modem Lines on page 2-6
- Creating Line Pools with ISDN Lines on page 2-8

Creating Line Pools with Modem Lines

To configure line pools with Raise DTR, V.25bis, and Hayes interfaces, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Pools, Backup Pools, or Bandwidth On Demand Pools**.	The Demand Pools, Backup Pools, or Bandwidth On Demand Pools window opens.
3. Click on **Add**.	The appropriate Pool Configuration window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Enter a number for the **Demand/Backup/ Bandwidth Pool ID** parameter then click on **OK**. You can use the same ID for a demand, backup, or bandwidth pool, but you cannot use the same ID for two pools of the same type. Click on **Help** or see the parameter description on page A-4.	The Lines Definition window opens.
5. Click on an available COM connector to assign a line to the pool, but consider the following: • Do not select any COM lines that you previously configured as leased lines. • The lines that you select for a demand pool must reside on the same slot. • The lines that you select for a backup or bandwidth pool can reside across slots.	The Choose WAN Serial Interface Type window, Sync Line Media Type window, or Async Line Media Type window opens. On the BLN and BCN, the Choose WAN Serial Interface Type window opens only for ports on an Octal Sync Link Module. For all other modules, the Sync Line Media Type window opens.
6. If applicable, set the **WAN Serial Interface Type** parameter then click on **OK**. Click on **Help** or see the parameter description on page A-5. Otherwise, go to step 7. If you plan to use Asynchronous PPP for your dial connections, you need to select Async for this parameter.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Set the **Line Media Type** parameter then click on **OK**. Click on **Help** or see the parameter description on page A-7. If you choose **Hayes** for this parameter, specify a modem type and initialization string for modem dialing (see Chapter 9 to modify modem parameters). For **V.25bis** and **Hayes** options, you need to configure an outgoing phone list (see "Creating an Outgoing Phone List" on page 2-27).	You return to the Lines Definition window. The letter D (demand), B (backup), or W (bandwidth) appears next to the COM port to indicate the type of line it is. Note that the router can use the same line for all three types of pools. Asynchronous ports have an at sign (@) next to the connector name. If several pools use the same line, a combination of the letters D, B, and W appear next to the connector name (for example, COM1DW). These letters appear only next to COM and ISDN connector names.
8. Select and configure more lines for the pool, if necessary.	
9. Choose **File**.	The File menu opens.
10. Choose **Exit**.	You return to the Pools window, which now has three new buttons (Edit, Apply, and Delete) that allow you to edit the new pool.
11. Go to one of the following: • "Configuring Circuits" on page 2-14 to configure dial-up circuits • The next section to add ISDN lines to the pool	

Creating Line Pools with ISDN Lines

Before configuring a line pool with ISDN lines, you need to select a port and designate it as a BRI or PRI interface. See the appropriate section for instructions:

- Configuring BRI Lines on page 2-9
- Configuring PRI Lines on page 2-11

Configuring BRI Lines

ISDN/BRI net modules are available only on the Access Node (AN®), Access Stack Node (ASN™), Access Node Hub (ANH™), and Advanced Remote Node™ (ARN™) hardware platforms.

You can configure BRI lines as dial-up lines or, for Germany and Japan only, as leased lines. Go to the appropriate section for instructions:

- Configuring BRI Dial-Up Lines on page 2-9
- Configuring BRI Leased Lines (Germany and Japan Only) on page 2-10

Configuring BRI Dial-Up Lines

To configure BRI lines, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an ISDN connector.	The Port Application window opens.
2. Set the **Port Application Mode** parameter, then click on **OK**. The default is **Dialup 2B+D**. Click on **Help** or see the parameter description on page A-19.	You return to the Configuration Manager window.
3. Repeat steps 1 and 2 for each BRI line that you want in the pool.	
4. Go to "Adding ISDN Lines to a Pool" on page 2-13.	

Configuring BRI Leased Lines (Germany and Japan Only)

For Germany and Japan, if your ISDN service provider does not use the D channel for call setup, or if you can use ISDN leased lines at an economical rate, you can configure your ISDN line to act as a leased line.

To set up BRI leased line service, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an ISDN connector.	The Port Application window opens.
2. Select a leased option for the **Port Application Mode** parameter. Click on **Help** or see the parameter description on page A-19.	The ISDN Leased Line B Channels window opens, showing two leased B channels.
3. Click on **Done**.	The Add Circuit window opens.
4. Click on an ISDN connector.	Site Manager supplies a value for the Circuit Name parameter.
5. Accept the value for the circuit name or specify another.	
6. Click on **OK**.	The WAN Protocols menu opens.
7. Select a WAN protocol, and then click on **OK**.	Site Manager prompts you to select a LAN protocol.
8. Select a LAN protocol, and then click on **OK** to complete the configuration.	You return to the Configuration Manager window.

To modify the leased-line configuration, see “Modifying BRI Leased-Line Service (Germany and Japan Only)” on page 11-20.

Configuring PRI Lines

PRI lines are available only on the ASN, BCN®, and BLN hardware platforms using the following link modules:

- Single or Dual Port Multichannel T1 Link Module (BLN and BCN)
- Dual Port Multichannel T1 Net Module (ASN)
- 120-ohm Single Port MCE1-II Link Module (BLN and BCN)
- 120-ohm Single or Dual Port MCE1-II Net Module (ASN)
- QMCT1 Link Module (BLN and BCN)

To configure PRI lines, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an MCT1 or MCE1 connector.	The Port Application window opens.
2. Set the **Port Application Mode** parameter to **PRI** and click on **OK**. Click on **Help** or see the parameter description on page A-18.	You return to the Configuration Manager window.
3. Repeat steps 1 and 2 for each PRI line that you want in the pool.	The Clock Parameters window opens. The clock parameters define the timing sources that apply to all connectors and DS0 timeslots supported by the MCT1 and MCE1 link modules.
4. Click on **OK**.	The MCT1 or MCE1 Port Parameters window opens. The port parameters apply to each of the 24 DS0 channels for MCT1 ports or 31 DS0 channels for MCE1 ports.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Click on **OK**. In most cases, you can use the defaults for MCT1 and MCE1 parameters. To modify these values, see *Configuring WAN Line Services*.	The PRI Logical Lines window opens. For the first PRI interface you configure, the Timeslots window opens immediately following the PRI Logical Lines window. Each PRI port supports up to 23 logical B channels for MCT1 ports or 30 logical B channels for MCE1 ports.
6. Choose **Select All** to change all timeslots to B channels. If you purchased selective PRI service from your ISDN provider, go to step 7.	All the timeslots now read B Channel.
7. Optionally, if you purchased selective PRI service from your ISDN provider, select individual timeslots. Select only the timeslots that the service provider assigns to you. For example, if your provider assigns you timeslots 1 through 10, select slots 1 through 10 in the Timeslots window.	A timeslot menu opens.
8. Select **B Channel**. Repeat the procedure for each timeslot you want to configure.	The configured timeslot should now read B channel.
9. Click on **OK**.	You return to the PRI Logical Lines window.
10. Click on **Done**.	You return to the Configuration Manager window.
11. Go to the next section, "Adding ISDN Lines to a Pool."	

Adding ISDN Lines to a Pool

To add ISDN BRI or PRI lines to a pool:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Pools, Backup Pools, or Bandwidth On Demand Pools**.	The Demand Pools, Backup Pools, or Bandwidth On Demand Pools window opens.
3. Click on **Add**.	The appropriate Pool Configuration window opens.
4. Enter a number for the **Demand/Backup/ Bandwidth Pool ID** parameter then click on **OK**. You can use the same ID for a demand, backup, or bandwidth pool, but you cannot use the same ID for two pools of the same type. Click on **Help** or see the parameter description on page A-4.	The Lines Definition window opens.
5. Choose a previously configured ISDN, MCT1, or MCE1 port.	The ISDN Switch Configuration window opens.
6. Set the **Switch Type** parameter. Click on **Help** or see the parameter description on page A-20.	Site Manager bypasses the ISDN Switch Configuration window for subsequent ISDN lines. Chapter 9 explains how to modify the switch type.
7. Click on **Done**.	The ISDN Logical Lines window opens.
8. Click on **OK**.	You return to the Lines Definition window. To modify the other switch parameters, see Chapter 9.
9. Choose **File**.	The File menu opens.
10. Choose **Exit**.	You return to the Pools window, which shows the configured pools. The window has three new buttons: Edit, Apply, and Delete.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
11. Repeat steps 3 through 10 to add more lines to the pool. For backup and bandwidth services, you can select lines across slots.	
12. Go to the next section, "Configuring Circuits," to configure dial-up circuits.	

Configuring Circuits

To configure dial-up circuits, go to the appropriate section for instructions:

- Creating PPP Dial-on-Demand Circuits on page 2-15
- Creating PPP Dial Backup Circuits on page 2-19
- Creating Bandwidth Circuits on page 2-22

When you create a PPP dial-up circuit, Site Manager creates a special PPP record for the circuit, which identifies who is calling the router. This record is listed in the PPP Interface Lists window as follows:

```
Interface for Dialup Lines
```

For more information about PPP, see *Configuring PPP Services*.

Creating PPP Dial-on-Demand Circuits

To configure frame relay demand circuits, skip this section and go to “Adding Frame Relay Demand Circuits” on page 12-2.

To configure PPP demand circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits.**	The Demand Pools window opens, listing the configured pools.
3. Select the pool that you want the circuit to use and click on **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Click on **Add**.	The PPP Demand Circuits window now shows the new circuit with the defaults for each parameter. Site Manager also adds the following buttons: Apply, Schedule, Phone Out, Delete, and BW on Demand.
5. Repeat step 4 for each demand circuit that you want to add.	
6. Keep the PPP Demand Circuits window open and go to the next section, “Specifying the Authentication Protocol Information.”	

Specifying the Authentication Protocol Information

For network security, the router must identify itself in the call setup message that it sends to the remote router. The authentication protocols, CHAP and PAP, enable the identification process. CHAP is the default protocol.

All lines in a pool must use the same authentication protocol.

To specify the CHAP information that the router uses when it calls a remote site:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits window, scroll down to the CHAP parameters.	
2. Set the **CHAP Local Name** and **CHAP Secret** parameters. Each **CHAP Local Name** must be unique, but the **CHAP Secret** must be the same for both sides of the connection. Click on **Help** or see the parameter descriptions beginning on page A-46.	
3. Keep the PPP Demand Circuits window open and go to the next section, "Specifying the Connection Mode."	

Specifying the Connection Mode

The connection mode determines which router places a call first if both sides of a connection establish a demand circuit at the same time, resulting in a collision. Both routers in a demand configuration can initiate a call. If a collision occurs, each router refers to the value of this parameter to determine whether to initiate subsequent calls or whether to wait and receive calls. You can also configure a router so that it never initiates a call.

To configure the connection mode:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits window, scroll down to the **Connection Mode** parameter.	
2. Set the **Connection Mode** parameter. Click on **Help** or see the parameter description on page A-37. If this router is set to Collision Master, set the router at the other side of the connection to Collision Slave.	
3. Keep the PPP Demand Circuits window open and go to the next section, "Enabling a Protocol."	

Enabling a Protocol

In this section, you enable IP. See *Configuring IP, ARP, RARP, RIP, and OSPF Services* for Site Manager window and parameter descriptions. To enable a different protocol, see “Adding Layer 3 Protocols to PPP Demand Circuits” on page 12-36.

To enable IP for a selected demand circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the top left corner of the PPP Demand Circuits window, choose **Protocols**.	The Protocols menu opens.
2. Choose **Add/Delete**.	The Select Protocols window opens.
3. Select **IP** then click on **OK**.	The IP Configuration window opens.
4. Set the **IP Address** parameter then click on **OK**. Click on **Help** or see *Configuring IP, ARP, RARP, RIP, and OSPF Services*.	You return to the PPP Demand Circuits window.
5. Do one of the following: • If you added ISDN lines or modem lines (V.25bis or Hayes) to the pool, go to “Creating an Outgoing Phone List” on page 2-27. • If you added only Raise DTR lines to the pool, click on **Done** and go to “Setting Up the Caller Resolution Table” on page 2-30.	

If you enable compression across PPP demand circuits and you configure the router to negotiate compression below the multilink bundle, do not configure protocol prioritization for demand circuits running PPP multilink. Protocol prioritization modifies the order in which packets are sent over the line, which could change the multilink-assigned order of packets and cause problems with the data. For more information about compression, see *Configuring Data Compression Services*.

Creating PPP Dial Backup Circuits

To create a PPP backup circuit, you designate a single leased circuit, leased PPP multiline circuit, or leased multilink circuit as a *primary circuit*. If the primary circuit fails, the router activates a backup circuit to continue transmitting data.

To configure frame relay backup circuits, skip this section and go to "Creating Frame Relay Backup Circuits for Group Mode PVCs" on page 13-5.

To configure PPP backup circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP**.	The Primary Circuit Definition window opens, which lists the leased circuits that you have configured.
4. Select a leased circuit name and click on **Cct Type**.	The Circuit Options window opens.
5. Set the **Circuit Type** parameter to **Primary**. Click on **Help** or see the parameter description on page A-67.	
6. Set the **Backup Pool ID** parameter to the ID of the backup pool that you want this circuit to use, then click on **OK**. Click on **Help** or see the parameter description on page A-68.	You return to the Primary Circuit Definition window, which displays the defaults for each parameter. Site Manager also adds the buttons Apply, Schedule, and Phone Out.
7. Repeat steps 4 through 6 to configure more primary circuits.	
8. Keep the Primary Circuit Definition window open and go to the next section, "Specifying the Backup Mode."	

Specifying the Backup Mode

The backup mode determines which router initiates a backup connection.

To specify the backup mode:

Site Manager Procedure	
You do this	**System responds**
1. Scroll down the Primary Circuit Definition window to the **Backup Mode** parameter.	
2. Set the **Backup Mode** parameter. Click on **Help** or see the parameter description on page A-70. If the router is set to Master, the peer must be set to Slave.	
3. Keep the Primary Circuit Definition window open and go to the next section, "Specifying the Authentication Protocol Information."	

Specifying the Authentication Protocol Information

For network security, the master router must identify itself when it calls the remote router. The authentication protocols, CHAP and PAP, enable the identification process. CHAP is the default protocol. All lines in a pool must use the same authentication protocol.

To specify the CHAP information for the router, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. Scroll down the Primary Circuit Definition window to the CHAP parameters.	
2. Set the **CHAP Local Name** and **CHAP Secret** parameters. The **CHAP Local Name** must be unique, but the **CHAP Secret** must be the same on both sides of the connection. Click on **Help** or see the parameter descriptions beginning on page A-46.	
3. Do one of the following: • If you added ISDN lines or modem lines (V.25bis or Hayes) to the pool, go to "Creating an Outgoing Phone List" on page 2-27. • If you added only Raise DTR lines to the pool, click on **Done** and go to "Setting Up the Caller Resolution Table" on page 2-30.	

Creating Bandwidth Circuits

You can provide bandwidth-on-demand service for either leased or dial-on-demand connections.

To enable bandwidth-on-demand service you can either:

- Designate a single leased circuit or a leased multilink circuit as a *bandwidth-on-demand* circuit. This designation indicates that these leased circuits are configured to use bandwidth-on-demand service.
- Assign a bandwidth-on-demand pool to a demand circuit.

If these circuits become congested, the router provides up to 29 dial-up lines to relieve the congestion, for a total of 30 dial-up lines for communication.

For configuration instructions, go to the next section for leased circuits or to "Adding Bandwidth Service for Demand Lines" on page 2-26.

Configuring Leased Circuits As Bandwidth Circuits

You should have already configured PPP multilink for the leased circuits that you will designate as bandwidth circuits.

To configure leased circuits as bandwidth circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth On Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens, which lists the leased circuits that you previously configured.
3. Select a leased circuit and click on **Cct Type**.	The Circuit Options window opens.
4. Set the **Circuit Type** parameter to **Bandwidth on Demand.** Click on **Help** or see the parameter description on page A-78.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Set the **Bandwidth-On-Demand Pool ID** parameter to the ID of the bandwidth pool that you want this circuit to use. Click on **Help** or see the parameter description on page A-78.	
6. Keep the Circuit Options window open and go to the next section, "Specifying the Bandwidth Mode."	

Specifying the Bandwidth Mode

The bandwidth mode determines whether the router serves as the congestion monitor. The level of congestion instructs the router when to provide additional circuits to carry data across the network.

Note: Ensure that the external clock speed of each synchronous line is set properly so that the router can calculate the congestion levels accurately. This does not apply for ISDN lines.

To configure the bandwidth mode:

Site Manager Procedure	
You do this	**System responds**
1. In the Circuit Options window, set the **Bandwidth Mode** parameter to **Monitor**. If this router is set to Non-Monitor, the peer must be set to Monitor. Click on **Help** or see the parameter description on page A-79.	If you accept the default, **Non-Monitor,** the Caller Resolution Info window opens. If you select **Monitor** and this is the first monitor circuit associated with a pool that uses multiple slots, the Preferred/ Reserved Slots for BOD Pool window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
2. If applicable, in the Caller Resolution Info window, set the **Caller Name** and **CHAP Secret** parameters, then click on **OK**. Otherwise, go to step 4. Click on **Help** or see the parameter descriptions beginning on page A-107. The caller resolution information enables the local, non-monitor router that receives the call to identify the remote router placing the call.	You return to the Circuit Options window.
3. If applicable, in the Preferred/Reserved Slots for BOD Pool window, set the **Preferred Bandwidth Slot** and **Reserved Bandwidth Slot** parameters and click on **OK**. Click on **Help** or see the parameter descriptions beginning on page A-85.	You return to the Circuit Options window.
4. Click on **OK**.	You return to the Bandwidth-on-Demand Circuit Definition window.
5. Keep the Bandwidth-on-Demand Circuit Definition window open and go to the next section, "Specifying the Authentication Protocol Information."	

Specifying the Authentication Protocol Information

For network security, the router must identify itself in the call setup message that it sends to the remote router. The authentication protocols, CHAP and PAP, enable the identification process. CHAP is the default protocol. All lines in a pool must use the same authentication protocol.

To specify the CHAP information for the local router:

Site Manager Procedure	
You do this	**System responds**
1. Scroll down the Bandwidth-on-Demand Circuit Definition window to the CHAP parameters.	
2. Set the **CHAP Local Name** and **CHAP Secret** parameters.The **CHAP Local Name** must be unique, but the **CHAP Secret** must be the same on both sides of the connection. Click on **Help** or see the parameter descriptions beginning on page A-46.	
3. Click on **OK**.	You return to the Bandwidth-on-Demand Circuit Definition window.
4. Do one of the following: • If you added ISDN lines or modem lines (V.25bis or Hayes) to the pool, go to "Creating an Outgoing Phone List" on page 2-27. • If you added only Raise DTR lines to the pool, click on **Done** and go to "Setting Up the Caller Resolution Table" on page 2-30.	

Adding Bandwidth Service for Demand Lines

If a demand line becomes congested, the router can provide 29 additional dial-up lines to reduce congestion. To do this, you enable bandwidth service for the demand line by associating it with a previously configured bandwidth pool.

To add bandwidth service for a demand line:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Circuits menu opens.
3. Choose **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Click on **BW on Demand**.	The Enter a BOD Pool window opens.
5. Enter the ID of an existing bandwidth pool for the **Bandwidth-on-Demand Pool ID** parameter then click on **OK**.	The BOD Configuration window opens. The parameters in this window determine whether the router acts as the monitor router, which means that it monitors congestion on the line, and whether the router activates additional lines to relieve congestion.
6. Optionally, click on **Remove BOD** only if you want to remove bandwidth service for the demand circuit; otherwise, go to the next step.	
7. Click on **OK**.	You return to the PPP Demand Circuits window.
8. Do one of the following: • If you added ISDN lines or modem lines (V.25bis or Hayes) to the pool, go to "Creating an Outgoing Phone List" on page 2-27. • If you added only Raise DTR lines to the pool, click on **Done** and go to "Setting Up the Caller Resolution Table" on page 2-30.	

Creating an Outgoing Phone List

For ISDN, V.25bis, and Hayes connections, the router uses the outgoing phone list to place a call to a remote router. The phone numbers in the list are the numbers of the remote routers. Outgoing phone lists are associated with a specific circuit, not with the physical line. Because lines in the pool can be used by many circuits, the telephone numbers are part of each circuit's configuration and not the line's configuration.

To create an outgoing phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits, Primary Circuit Definition, or Bandwidth-on-Demand Circuit Definition window, select a circuit.	
2. Click on **Phone Out**.	The Outgoing Phone List window opens.
3. Click on **Add.**	The Phone Number window opens.
4. Set the following parameters: • **Outgoing Phone Number** • **Outgoing Phone Ext/SubAddr** Click on **Help** or see the parameter descriptions beginning on page A-95.	
5. Click on **OK**.	You return to the Outgoing Phone List window with the phone number parameters and the phone list filled in.
6. Accept the defaults for the following parameters unless your service provider instructs otherwise: • **Outgoing Phone Number Type** • **ISDN Numbering Type** • **ISDN Numbering Plan** Click on **Help** or see the parameter descriptions beginning on page A-98.	
7. Repeat the procedure for each phone number that you want to add.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
8. Click on **Done**.	You return to the appropriate Circuit window.
9. For ISDN configurations, go to the next section; otherwise, go to "Setting Up the Caller Resolution Table" on page 2-30.	

Creating the Local Phone List (ISDN Only)

A router uses its local phone number for the following purposes:

- To identify itself when it places a call to a remote router. The local router includes its own phone number in the ISDN outgoing call setup message.
- To identify itself to the ISDN switch so that the switch can activate the circuit. In the United States and Canada, the Service Profile ID (SPID) is also required.
- To ensure that an incoming call was received at the intended destination. When the local router receives a call, it checks that the phone number in the incoming call setup message is the same as its own local phone number.

Your ISDN service provider assigns this number.

You can optionally configure a local phone list for all three dial services using ISDN connections. However, if you use the Bandwidth Allocation Protocol (BAP) with bandwidth service across ISDN connections, configuring a local phone list is required. The router designated as the non-monitor uses the local phone number to identify additional lines to the peer.

To create a local phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window choose **Dialup**.	The Dialup menu opens.
2. Choose **Local Phone Numbers**.	The ISDN Local Phone Lines window opens.
3. Click on **Local Phones**.	The ISDN Local Phone Numbers window opens. The SPID parameter appears only for switches used in the United States and Canada.
4. Click on **Add**.	The Phone Number window opens.
5. Set the following parameters: • **Directory Number** • **Ext/SubAddr** • **SPID** (US and Canada only) Click on **Help** or see the parameter descriptions beginning on page A-91.	
6. Click on **OK**.	You return to the ISDN Local Phone Numbers window, which shows the new phone entry.
7. Repeat steps 4 through 6 to add more phone numbers.	
8. Click on **Done**.	You return to the ISDN Local Phone Lines window.
9. Click on **Done**.	You return to the Configuration Manager window.
10. Go to the next section, "Setting Up the Caller Resolution Table."	

Setting Up the Caller Resolution Table

For network security, all three dial services use a PPP identification mechanism to determine who is calling the router. PPP performs this identification process using one of two authentication protocols, CHAP or PAP. CHAP is the default protocol.

Note: If you are configuring RADIUS with a dial service, the router uses vendor-specific attributes for authentication. In this case, do not configure a caller resolution table.

To identify an incoming remote caller using CHAP, you enter the caller name and CHAP secret of each remote caller in a *caller resolution table*, and associate each name with a local demand, primary, or bandwidth circuit. When a router receives an incoming call, it checks the caller resolution table for an entry that identifies the caller. If the caller is authorized, the local router maps the caller to a logical circuit number, and then activates that circuit.

To configure the caller resolution table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add**.	The Caller Name and Secret/Password window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Set the following parameters: • **Caller Name** • **CHAP Secret** Click on **Help** or see the parameter descriptions beginning on page A-107. The Caller Name parameter identifies a remote router. Do not confuse this parameter with the CHAP Local Name parameter, which identifies the local router, that is, the router you are currently configuring.	
5. Click on **OK**.	The Local Circuit List window opens, which lists the demand, primary, or bandwidth circuits that you have configured.
6. Set the **Local Circuit** parameter by choosing from the list of circuits that Site Manager provides. The router activates this circuit when it receives a call from the remote caller. Click on **Help** or see the parameter descriptions beginning on page A-109.	
7. Click on **OK**.	You return to the Caller Resolution Table window. If you select a caller name in the window, the parameters display the caller's information.
8. Repeat steps 3 through 6 to configure other table entries.	
9. Click on **Done**.	You return to the Configuration Manager window.

What to Do Next

After you complete the steps in this chapter, your dial service should be operating. To learn about Nortel Networks dial services implementations, see Chapters 5 through 8. To customize your configuration, see Chapters 9 through 16.

Chapter 3
Starting Dial Services Using the BCC

In this chapter, you will create a basic dial-on-demand or dial backup configuration using the BCC, that is, a configuration using all available defaults. Subsequent chapters explain how to customize the basic configuration to suit your needs.

Note: You cannot use the BCC to configure bandwidth-on-demand service.

This chapter includes the following information:

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Before You Begin

Before you configure a dial service, you must do the following:

- Install the router.
- Install either ISDN or modem lines.
- Order ISDN service (if applicable) and receive the information for setting up ISDN configurations (for example, switch type and phone numbers). For information about ordering ISDN lines in the United States, see Appendix D, “Ordering ISDN Lines in the United States.”
- Order and configure external modems (if applicable).
- Determine the Challenge Handshake Authentication Protocol (CHAP) names and secrets for routers making connections with the Point-to-Point Protocol (PPP).
- Open the configuration file that you want to configure for dial services.

Using the BCC

For complete information about the BCC, see *Using the Bay Command Console (BCC)*.

BCC Help

For descriptions of all the parameters for a specific object, enter:

help <*object_name*>

For example, to see the parameters for the backup circuit context, enter:

`backup-circuit/8/1/1#` **help backup-circuit**

If the object exists in several locations within the BCC configuration hierarchy, the BCC displays a list of objects.

To display the legal, current, and default values for a parameter, navigate to the object prompt from where you configure the parameter and enter:

<parameter> **?**

For example:

```
ppp/to-boston# callback-client-delay ?
Current value: 5
Legal values: RANGE(0-1800)
Default value: 5
```

To see what subcontext you can navigate to from the present context, at the current context prompt enter:

?

For example, to see what subcontexts you can navigate to from the backup-circuit context enter:

```
backup-circuit/1/1/1# ?

Sub-Contexts:

caller-resolution       out-phone-number        schedule
```

Specifying a Physical Interface for the ASN

If you are configuring a physical interface on the ASN using the BCC, you must specify the slot, module, and connector for the interface. For example, if you are configuring BRI on the ASN you would enter:

```
stack# bri 3/2/1 mode 2b+d
```

In this example, you configure the interface on slot 3, module 2, connector 1.

Specifying a Physical Interface for the ARN

Using the BCC, the ARN physical layer is defined by the **modem** object. To configure a physical interface for the ARN, navigate to the box prompt and enter:

modem <*slot/connector*>

For example, to configure a modem interface on slot 1 connector 1, navigate to the box prompt and enter:

```
box# modem 1/1
```

Demand Circuit Naming Conventions

If you use a demand circuit name that has spaces in it, for example PPP Demand 1, the name will be enclosed by braces when you see the output of the **show config** command and when you issue an **lso** command, for example:

```
demand-pool/255# show config -r

demand-pool pool-id 255

demand-line line-type serial slot 1 module 1 connector 4

demand-circuit circuit-name {PPP Demand 1}
```

In addition, when you need to navigate to a circuit whose name has spaces, you will need to use curly braces as part of your navigation command entry. For example, to navigate from the demand-pool prompt to the demand-circuit prompt for the circuit named PPP Demand 1, enter:

```
demand-pool/255# {demand-circuit/PPP Demand 1}

demand-circuit/PPP Demand 1#
```

Setting Up a Dial Service

Each dial service has many configurable parameters, but for a basic configuration, you change only a subset of these parameters.

Setting up a dial service involves the following main tasks:

1. Creating the leased interface that will use backup service (dial backup only)
2. Configuring the dial-up physical interface
3. Creating line pools
4. Configuring circuits that use the configured line pools

Each task involves several steps, which are described later in this chapter.

Table 3-1 lists the basic tasks required to set up a dial service. These tasks apply to modem and ISDN configurations.

This basic configuration assumes the following:

- PPP is the layer 2 protocol.
- IP is the layer 3 protocol.
- There is no ISDN caller ID service; therefore, no incoming phone list is required.

This basic configuration does not address every application. There are many other features and functions that you can configure. For instructions on customizing the basic configuration, see Chapters 9 through 16.

Table 3-1. Setting Up a Default Modem or ISDN Configuration Using the BCC

Task	BCC Command
1. For dial backup service, define the leased interfaces, including the layer 2 and layer 3 protocols. These interfaces become primary circuits after you assign a backup circuit to the interface.	See *Configuring WAN Line Services* for instructions on creating leased interfaces.
2. Configure the modem and ISDN physical interfaces that will become dial-on-demand or dial backup lines.	serial* mct1 mce1 modem bri pri channel
3. Specify whether the connections are synchronous or asynchronous (modules that support asynchronous PPP only).	wan-type
4. Define the modem signaling (modem lines only).	media-type
5. Designate the interface as a dial object to be used in line pools.	dial
6. Create a line pool and assign an ID to the pool.	backup-pool or demand-pool
7. Add lines to the backup or demand pool.	backup-line or demand-line
8. Designate the primary interface by adding a backup circuit to the interface (backup only).	backup-circuit
9. Specify the ISDN switch type (ISDN only).	switch-type
10. Create a demand circuit.	demand-circuit
11. Specify the circuit connection mode.	backup-mode or connection-mode
12. Specify authentication protocol information (CHAP is the default protocol).	chap-name
	chap-secret
13. Create an outgoing phone list.	out-phone-number phone-number subaddress-extension
14. Create a local phone list (ISDN only).	local-phone-number phone-number subaddress-extension spid (United States and Canada only)
15. Set up the caller resolution table.	caller-resolution caller-name secret

* Not all of these interface types are shown in this chapter.

Dial-on-Demand Configuration Hierarchy

Figure 3-1 shows the hierarchy of dial-on-demand objects and the relationship between objects. The serial, mce1, and mct1 objects at the top of the hierarchy are leased interfaces for the hot-standby object. The bri, mce1, mct1, modem, and serial objects at the lower part of the hierarchy are the dial interfaces.

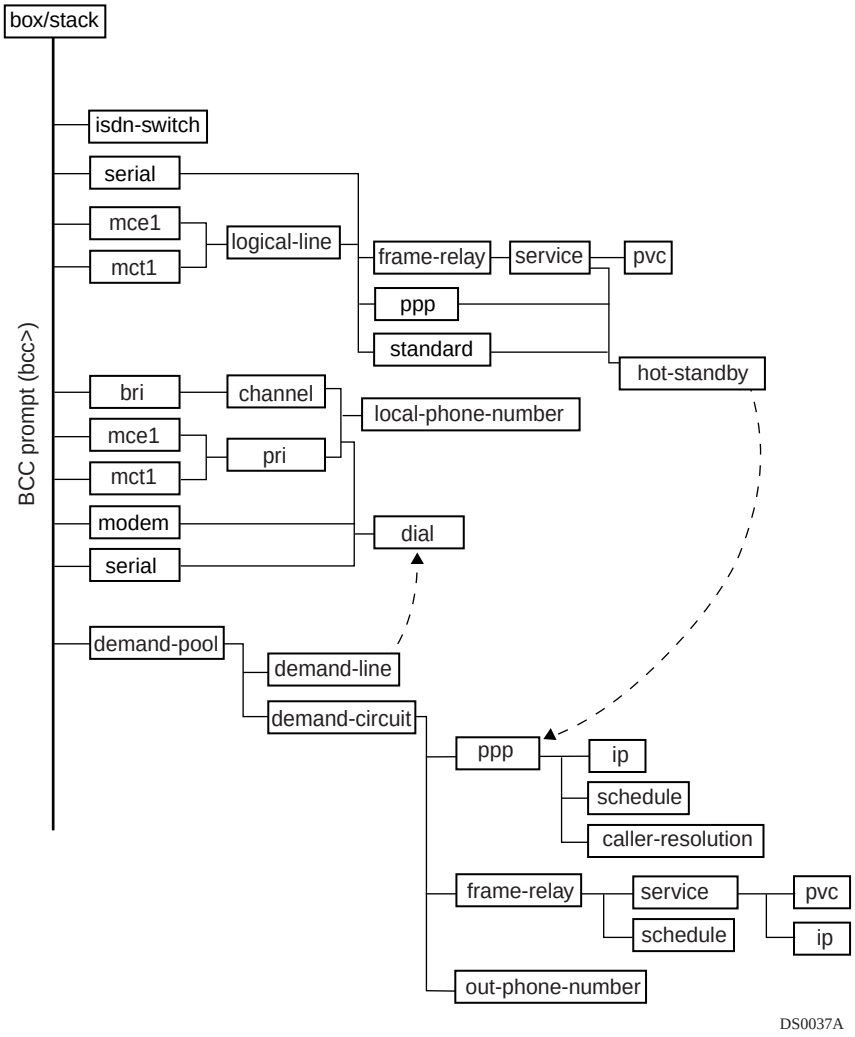


Figure 3-1. Dial-on-Demand Configuration Hierarchy

Dial Backup Configuration Hierarchy

Figure 3-2 shows the hierarchy of dial backup objects. This diagram shows the relationship of each object to other objects.

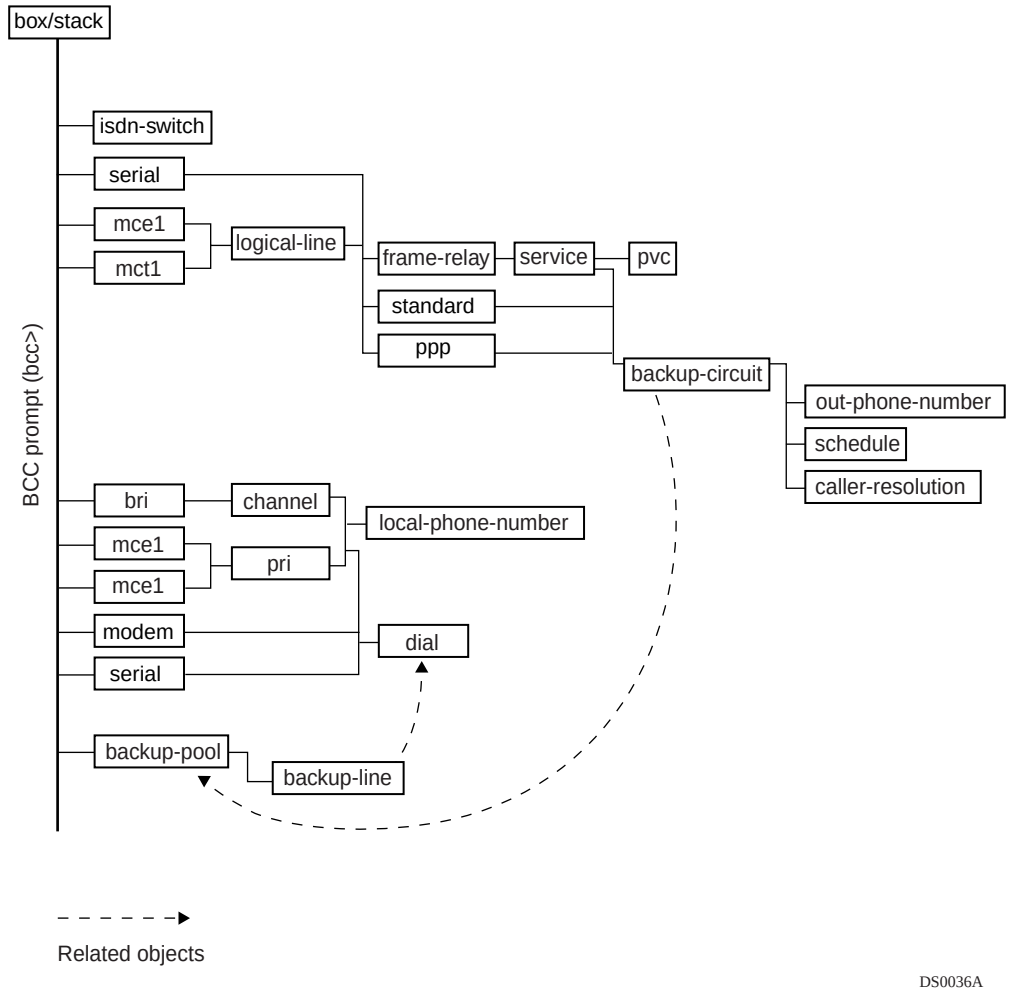


Figure 3-2. Dial Backup Configuration Hierarchy

Creating a Leased Interface for Backup Service

To implement dial backup service, you must first configure the leased interface that will use backup service. The leased interface is called the *primary* circuit. If the primary circuit fails, the router activates the backup connections to carry data.

To configure the primary circuit, specify the type of leased interface and define the data link and network layer protocols.

For example, to create a primary serial interface on slot 2 connector 1 that uses PPP and IP, begin at the box prompt and enter the following commands:

```
box# serial 2/1

serial/2/1# ppp

ppp/2/1# ip 192.122.32.1 mask 255.255.255.0

ip/192.122.32.1/255.255.255.0# box

box#
```

To create a leased MCT1 line with frame relay and IP on slot 4 connector 1, enter the following commands:

```
box# mct1 4/1

mct1/4/1# logical-line boston

logical-line/boston# frame-relay; service boston; pvc 100; back

service/boston# ip 192.122.32.1 mask 255.255.255.0

ip/192.122.32.1/255.255.255.0# box

box#
```

For more information about configuring WAN line interfaces using the BCC, see *Configuring WAN Line Services.* For more information about configuring IP, see *Configuring IP, ARP, RARP, RIP, and OSPF Services.*

Configuring a Modem Interface

This section explains how to configure a modem interface. To configure a dial service for ISDN interfaces, go to "Configuring an ISDN Interface" on page 3-12.

To configure line pools with Raise DTR, V.25bis, and Hayes interfaces:

1. **Create the serial interface that will become the dial line.**

   For example, to create a serial interface on slot 1 connector 1, begin at the box prompt and enter:

   `box#` **serial 1/1**

   For the ARN, enter:

   `box#` **modem 1/1**

2. **Specify the WAN serial type to indicate whether this interface is for synchronous or asynchronous connections.**

   Navigate to the interface prompt and enter:

   wan-type <*type*>

   type can be:

   synchronous - This is the default. Choose this option for synchronous connections.

   asynchronous - Choose this option if you are using asynchronous PPP across the backup lines. Otherwise, accept the default, synchronous.

   polled-asynchronous - Not applicable for dial services.

   For example, for a serial interface on a BLN you would enter:

   `serial/1/1#` **wan-type synchronous**

   For the ARN, navigate to the modem prompt and enter:

   `modem/1/1#` **wan-type synchronous**

3. **Specify the modem signaling by entering:**

   media-type <*type*>

   type can be:

   raise-dtr - A signaling method that enables access to the network by preprogramming the destination phone numbers into the dial device. Raise DTR signaling works with these interfaces: X.21, V.35, RS-232, and RS-422.

v25bis - A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Using V.25bis, the dial device can use multiple phone numbers to call multiple destinations. V.25bis signaling works with these interfaces: X.21, V.35, RS-232, and RS-422.

For V.25bis, you must configure an outgoing phone list (see "Creating an Outgoing Phone List" on page 3-21).

hayes - A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Hayes signaling is for asynchronous PPP and works with RS-422 and V.34 interfaces. To use Hayes as the serial media type, you must also specify a modem initialization string. The router sends this string to the modem to initiate a call.

If you choose this option, specify a modem type (ARN only) and an initialization string for modem dialing. For instructions, see Chapter 10, "Customizing Modem Lines." In addition, you need to configure an outgoing phone list (see "Creating an Outgoing Phone List" on page 3-21).

Note: Select only raise-dtr, v25bis, and hayes for the media-type. The other media types that the BCC lists apply to leased interfaces only.

For example, navigate to the serial prompt and enter:

`serial/1/1#` **media-type v25bis**

For the ARN, navigate to the modem prompt and enter:

`modem/1/1#` **media-type v25bis**

4. **Go to one of the following sections:**

   - To configure ISDN interfaces, go to "Configuring an ISDN Interface" on page 3-12.
   - To configure a dial object, go to "Designating an Interface As a Dial Object" on page 3-14.

Configuring an ISDN Interface

Before creating a pool with ISDN lines, you need to select a port and designate it as a BRI or PRI interface. Refer to the appropriate section for instructions:

- Configuring BRI Lines on page 3-12
- Configuring PRI Lines on page 3-14

Configuring BRI Lines

ISDN/BRI net modules are available only on the Access Node (AN), Access Stack Node (ASN), Access Node Hub (ANH), Advanced Remote Node (ARN), and System 5000™ platforms.

To configure BRI interfaces, you specify the interface for BRI service and the type of service, for example, whether one or two B channels are available.

To configure a BRI object:

1. **Create the BRI interface by entering:**

   bri <*slot/connector*> **mode** <*mode_type*>

   mode_type specifies whether the BRI line is operating as a dial-up line or as a leased line. Table 3-2 lists the modes.

   When choosing a mode, follow these guidelines:

   - If you have a dial-up application, choose one of the dial-up modes.
   - For networks in Germany and Japan, you can configure a permanent point-to-point ISDN connection over a B channel, without having to use the D channel to dial the call. This connection operates like a leased line. To configure leased BRI connections, select one of the leased modes.

     Note that for leased BRI applications, your ISDN switch must be able to support these connections.

Table 3-2. Mode Types for BRI Operation

Mode	Meaning
2b+d	Specifies that this is an ISDN switched line that provides two B channels and that call setup occurs between the router and an ISDN switch.
1b+d	Specifies that this is an ISDN switched line that provides only one B channel and that call setup occurs between the router and an ISDN switch. Use this option when you do not need to use two B channels.
floating-b	Only for AN, ANH, and ARN router, specifies that although this is an ISDN switched line providing two B channels, the software makes the necessary adjustments if only one channel is in use. Use this option if you can purchase only 2B + D service, but only want to use one B channel, or if your application requires two synchronous ports and only one B channel.
leased-64k	Specifies that this line provides one B channel that is always available. No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).
leased-2x64k	Specifies that this line provides two B channels that are always available. No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).
leased-128k	Specifies that this line provides one B channel that is always available. (The extra bandwidth of the 128 Kb/s channel is equivalent to having two B channels of 64 Kb/s.) No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).

Note that when you create a BRI object, the BCC automatically creates a channel object.

For example, to configure an interface with two B channels and one D channel, enter:

```
box# bri 3/1 mode 2b+d
```

2. **Navigate to the BRI channel prompt by entering:**

   channel

   For example:

   ```
   bri/3/1# channel
   ```

   At the channel context, you will designate this BRI interface as a dial object.

3. **Go to "Designating an Interface As a Dial Object" on page 3-14.**

Configuring PRI Lines

PRI lines are available only on the ASN, BCN, and BLN platforms using the following link modules:

- Single or Dual Port Multichannel T1 Link Module (BLN and BCN)
- Dual Port Multichannel T1 Net Module (ASN)
- 120-ohm Single Port MCE1-II Link Module (BLN and BCN)
- 120-ohm Single or Dual Port MCE1-II Net Module (ASN)
- QMCT1 Link Module (BLN and BCN)

To configure PRI lines, create the physical interface for the backup PRI interface by entering:

mct1 <*slot/module/connector*>**; pri**

or

mce1 <*slot/module/connector*>**; pri**

module is only required for the ASN router.

For example:

```
box# mct1 3/1; pri
```

For more information about MCT1 and MCE1 parameters, see *Configuring WAN Line Services*.

Go to "Designating an Interface As a Dial Object" on page 3-14.

Designating an Interface As a Dial Object

Designating an interface as a dial object tells the router that it can use the interface as a dial line in a line pool.

For dial backup lines, the **dial** command also configures the default layer 2 protocol, PPP.

To make an interface a dial object, navigate to the interface prompt and enter:

dial

For example, to make serial interface 1/1 a dial object, enter:

```
serial/1/1# dial
```

To make BRI interface 3/1 a dial object, navigate to the channel prompt and enter:

```
channel/3/1# dial
```

To make PRI interface 2/1 a dial object, navigate to the pri prompt and enter:

```
pri/2/1# dial
```

The dial command indicates that interface is now available to be used as a dial line in a line pool.

Note: If you purchased selective PRI service from your ISDN provider, see Chapter 9, "Customizing Line Pools," for instructions on configuring a subset of B channels from the full complement of B channels.

Creating a Line Pool

A *line pool* is a group of one or more lines that reside on the router slots. You identify each pool by assigning it a *pool ID*. Each line can connect to a modem or directly to an ISDN network (using a router with internal ISDN). A line pool can have a combination of synchronous and asynchronous interfaces.

To create a demand pool or backup pool, navigate to the box prompt and enter:

demand-pool <*pool-id*> or **backup-pool** <*pool-id*>

pool-id can be a number from 1 to 255.

For example, to create a demand pool with an ID of 8, enter:

```
box# demand-pool 8
demand-pool/8#
```

Adding Lines to the Pool

To add a backup line to a pool, navigate to the backup-pool prompt and enter:

backup-line <*line-type*>/<*slot/module/connector*>

To add a demand line to a pool, navigate to the demand-pool prompt and enter:

demand-line <*line-type*>/<*slot/module/connector*>

line-type indicates the interface type of the associated dial object. The value can be serial, bri, or pri. For the ARN, use serial as the line type.

slot/module/connector identifies the physical interface. You specify a module number only for ASN and System 5000 routers.

For example, to add the backup line (serial interface 1/1) to backup pool 8, enter:

```
backup-pool/8# backup-line serial/1/1
backup-line/8/serial/1/1#
```

The pool ID becomes part of the backup-line and demand-line prompts automatically.

If you defined multiple dial interfaces, you could add multiple lines to the same pool, for example:

```
backup-pool/8# backup-line serial/1/1; backup-line bri/3/1
```

Be aware of the following when selecting lines for a pool:

- All the lines in a demand pool must reside on the same slot and can combine Raise DTR, V.25bis, Hayes, and ISDN lines.
- Do not use any lines previously configured as leased lines for the backup pool.
- The lines in a backup pool can reside across slots and can combine Raise DTR, V.25bis, Hayes, and ISDN lines.

Go to one of the following sections:

- Specifying the ISDN Switch Type on page 3-17
- Specifying the Authentication Protocol Information on page 3-20

Specifying the ISDN Switch Type

For ISDN networks, you must ensure that the router is configured to communicate with the ISDN switch at the service provider site.

The BCC configures the isdn-switch object automatically when you issue the **dial** command at a BRI channel prompt or PRI interface prompt. The router uses a default switch type of **pri5ess** for PRI and **brinet3** for BRI. You must set the switch-type parameter to the correct value for your network, or the dial-up line will not operate properly.

To specify the switch type, navigate to the isdn-switch prompt and enter:

switch-type <*type*>

type is the type of switch used in the network, and can be any of the following:

brinet3	brintt	prikdd
briswissnet3	brits013	printt
bri5ess	brini1	prinet5
bridms100	pri4ess	prits014
brivn3	pri5ess	
brikdd	pridms100	

For example:

```
isdn-switch/3# switch-type brini1
```

Go to one of the following sections:

- Configuring PPP Demand Circuits on page 3-18
- Configuring PPP Backup Circuits on page 3-19

Configuring PPP Demand Circuits

After you create a demand pool and add lines to it, you configure the demand circuits. The demand pool must have at least one demand line configured before you can add a demand circuit.

To create a demand circuit, navigate to the demand-pool prompt and enter:

demand-circuit *<circuit_name>*

circuit_name is any text string.

For example, to configure a demand circuit associated with demand pool 1, enter:

```
demand-pool/1# demand-circuit circuit-to-boston
```

Adding Protocols to the Demand Circuit

After you add the demand circuit, you can assign protocols to it. PPP is the default layer 2 protocol for a demand circuit; the PPP object is automatically part of the demand circuit context.

To navigate to the PPP context, you enter **ppp** at the demand-circuit prompt, for example:

```
demand-circuit/demand-to-boston# ppp
```

This command now puts you at the PPP demand circuit prompt, for example, `ppp/demand-to-boston#`.

To add IP to the demand circuit, from the PPP demand circuit prompt enter:

ip <*ip_address*>/<*subnet_mask*>

ip_address is any valid IP address.

subnet_mask is any valid 32-bit mask.

For example, to add IP to the demand circuit demand-to-boston, enter:

```
ppp/demand-to-boston# ip 192.132.23.1/255.255.255.0
ip 192.132.23.1/255.255.255.0#
```

Defining the Circuit's Connection Mode

After you specify the protocol for the demand circuit, in this case, PPP, you can configure the connection mode. The *connection mode* determines the role of each router when two routers try to establish a demand circuit with each other at the same time, resulting in a collision. If a collision occurs, each router refers to the connection mode to determine whether to initiate subsequent calls or whether to wait and receive calls. The default connection mode is collision-master.

To set the connection mode, navigate to the PPP demand circuit prompt and enter:

connection-mode <*mode*>

mode can be no-dial, collision-master, or collision-slave.

To avoid continual collisions, configure one router as collision-master and the other as collision-slave. To ensure that a router receives calls, but never initiates calls, enter no-dial. Calls are then made only in one direction.

For example, to configure a router as the collision-slave, enter:

```
ppp/circuit-to-Boston# connection-mode collision-slave
```

After the connection mode is set, go to "Specifying the Authentication Protocol Information" on page 3-20.

Configuring PPP Backup Circuits

After you create the backup pool and add lines to it, you add backup circuits and the backup mode for these circuits. The backup mode determines which router initiates dialing to establish a backup connection if the primary circuit fails.

To create a backup circuit, navigate to the leased interface prompt for which you are configuring backup service. For example, to navigate to the leased interface on slot 2 connector 1, enter:

```
backup-pool/8# box; serial 2/1; ppp
ppp/2/1#
```

From the leased interface prompt, create a backup circuit by entering:

backup-circuit pool-id <*pool-id*> **backup-mode** <*mode*>

mode can be:

initiator - Instructs the router to initiate dialing. The router at the other end must be set to **receiver** so that it waits until the initiator router makes the call. Only a router on one side of the link can serve as the initiator. If both are set to **initiator**, they may try to initiate a call simultaneously, resulting in a collision on the network.

receiver - Instructs the router to wait to receive the call from the initiator. If you configure the router to be the receiver, you must create a caller resolution entry for the circuit that identifies the remote initiator router. The local router can then verify the initiator's identity and accept the incoming calls.

For example, the following command creates a backup circuit that uses the lines in pool 8, designates the leased PPP interface 2/1 as a primary interface, and sets the backup mode to **initiator**.

```
ppp/2/1# backup-circuit pool-id 8 backup-mode initiator
```

Go to "Specifying the Authentication Protocol Information" on page 3-20.

Protocols for Backup Circuits

For dial backup lines, the **dial** command also configures the default data link protocol, PPP. Using the BCC, PPP is the only protocol you can configure for the backup circuit.

Specifying the Authentication Protocol Information

For network security, the router that initiates a call must identify itself to the remote router. The authentication protocols, CHAP and PAP, enable the identification process. CHAP is the default protocol. All lines in a pool must use the same authentication protocol.

The *CHAP name* is part of the outbound call; it informs remote peer routers of the local router's identity.

The *CHAP secret* is for identification and security purposes, and must be the same on both sides of the link. When one router places a call to another router, an authentication process takes place. During this phase, the routers send challenge packets back and forth that include the CHAP secret. Both routers on a link must have the same CHAP secret to correctly calculate responses to the challenges.

To specify a CHAP name and secret for a demand circuit, navigate to the ppp demand circuit prompt. For a backup circuit, navigate to the backup circuit prompt.

At the circuit prompt, enter:

chap-name <*text-string*> **chap-secret** <*text-string*>

text-string is any text string up to 20 characters.

For example, to configure a CHAP name and secret for the demand circuit, circuit-to-boston, enter:

```
ppp/circuit-to-boston# chap-name bayrs1 chap-secret east
```

To configure a CHAP name and secret for the backup circuit, enter:

```
backup-circuit/8/1/1# chap-name bayrs1 chap-secret east
```

After configuring the authentication protocol information, do one of the following:

- If the line pool includes ISDN lines or modem lines that use Hayes, or V.25bis signalling, go to "Creating an Outgoing Phone List" on page 3-21.
- If the line pool has only modem lines that use Raise DTR signaling, go to "Setting Up the Caller Resolution Table" on page 3-24.

Creating an Outgoing Phone List

For ISDN, V.25bis, and Hayes connections, the router uses the outgoing phone list to place a call to a remote router. Outgoing phone lists are associated with a specific circuit, not with the physical line. Because the lines in the pool can be used by many circuits, the telephone numbers are part of each circuit's configuration and not the line's configuration.

To create an outgoing phone list, navigate to the demand-circuit or backup-circuit prompt and enter:

out-phone-number <*string*>

string is a numeric string up to 25 characters. Do not enter space, special, or alphabetic characters in the telephone number.

For example, to create an outgoing phone number for a demand or backup circuit, enter:

```
demand-circuit/circuit-to-boston# out-phone-number 9786665432
```

```
backup-circuit/8/1/1# out-phone-number 9786665432
```

You can also include a subaddress/extension to further identify the remote router. For ISDN calls, this subaddress is useful when there are several routers at a destination site, but the ISDN provider assigns only one phone number to the destination. An incoming call must specify the number and subaddress to reach a specific router.

To configure an extension, navigate to the out-phone-number prompt and enter:

subaddress-extension *<string>*

string is a numeric string up to 25 characters. Do not enter space, special, or alphabetic characters in the extension.

For example, to configure an extension for the outgoing phone number, 9786665432, enter:

```
out-phone-number/backup/8/1/1/9786665432# subaddress-extension 456
```

For ISDN configurations, go to the next section; otherwise, go to "Setting Up the Caller Resolution Table" on page 3-24.

Creating the Local Phone List (ISDN Only)

A router uses its local phone number for the following purposes:

- To identify itself when it places a call to a remote router. The local router includes its own phone number in the ISDN outgoing call setup message.
- To identify itself to the ISDN switch so that the switch can activate the circuit. In the United States and Canada, the Service Provider ID (SPID) is also required.
- To ensure that an incoming call was received at the intended destination. When the local router receives a call, it checks that the phone number in the incoming call setup message is the same as its own local phone number.

To configure phone numbers for a local phone list, navigate to the pri or channel (for BRI) prompt and enter:

local-phone-number *<number>*

number is a numeric string up to 20 characters.

For example:

`pri/2/1#` **local-phone-number 5553427**

If necessary, you can enter a subaddress for the main phone number. The subaddress is useful when you have several routers at your site, but the ISDN provider assigns only one phone number to the site. An incoming call must specify the number and the subaddress to reach a specific router.

After you configure a phone number, you can specify a subaddress. Navigate to the local-phone-number prompt and enter:

subaddress-extension *<number>*

number is a numeric string up to 25 characters.

For example, to add an extension to local phone number 5553427, enter:

`local-phone-number/2/1/5553427#` **subaddress-extension 897**

If necessary, enter the SPID that your ISDN provider supplied when you received ISDN service. Ignore this parameter if you have a 5ESS switch and you have set the **line-type** parameter to **point-to-point**.

To set the SPID, navigate to the local-phone-number prompt and enter:

spid *<string>*

string is a numeric string up to 20 characters.

For example, to enter a SPID for local phone number 5553427, enter:

`local-phone-number/2/1/5553427#` **spid 50855534270100**

Go to the next section, "Setting Up the Caller Resolution Table."

Setting Up the Caller Resolution Table

To identify an incoming remote caller, you enter the name and CHAP secret of each remote caller in a *caller resolution table* and associate each name with a local demand, primary, or bandwidth circuit. When a router receives an incoming call, it checks the caller resolution table for an entry that identifies the caller. If the caller is authorized, the local router activates a circuit.

Note: If you are configuring RADIUS with a dial service, the router uses vendor-specific attributes for authentication. In this case, do not configure a caller resolution table.

CHAP is the default authentication protocol, so you must enter the remote router's CHAP name and CHAP secret in the caller resolution table.

To configure the caller resolution table, navigate to the protocol demand-circuit prompt for dial-on-demand or the backup-circuit prompt for dial backup and enter:

caller-resolution caller-name *<string>* **secret** *<string>*

string is any text string up to 20 characters. This name is part of the incoming call and informs the local router of the remote router's identity.

You do not need to enter the keyword **caller-name**; you can simply provide the name string.

The CHAP secret must be the same on both sides of the connection.

For example, to configure caller resolution for a backup circuit, enter:

```
backup-circuit/8/3/1# caller-resolution caller-name baynet1 secret bayeast
```

To configure caller resolution for a demand circuit, enter:

```
ppp/circuit-to-boston# caller-resolution baynet1 secret bayeast
```

What to Do Next

After you complete the steps in this chapter, your dial service should be operating. To learn about Nortel Networks dial services implementations, see Chapters 5 through 8. To customize your configuration, see Chapters 9 through 16.

Chapter 4
ISDN Overview

This chapter contains the following information:

Topic	Page
ISDN Standards	4-2
ISDN Interfaces	4-5
For More Information About ISDN	4-8

Integrated Services Digital Network (ISDN) is an internetworking technology that integrates voice, data, and video communication over end-to-end digital connections (Figure 4-1). From an internetworking perspective, the router can use ISDN to provide LAN interconnection services over a wide area.

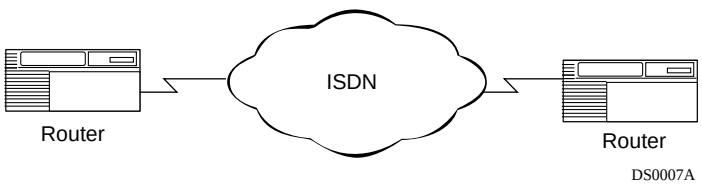


Figure 4-1. Sample ISDN Network

Because ISDN integrates services and offers multiple communication channels, it is more versatile than traditional network services that support only one channel. With ISDN, you can use the same lines and equipment for a variety of communication needs. Also, using digital lines, as opposed to analog lines, eliminates the need to convert digital to analog signals and provides faster and more accurate communication.

In addition to offering integrated services, ISDN provides a number of standard, universal interfaces to access ISDN services. With a defined set of interfaces, you can purchase ISDN equipment and services from different providers and all the parts of your network will have the same interfaces to connect to one another as well as to the ISDN network.

ISDN is primarily a dial service that uses switched connections as circuits. This means that you can use channels and services on an as-needed basis instead of having a connection up all the time, regardless of need. This choice ensures a cost-effective use of phone lines as well as bandwidth efficiency.

ISDN Standards

The ITU-T (formerly CCITT) has defined a set of standards to ensure universal implementation of ISDN technology. The following sections describe some of these standards.

Basic Rate Interface

BRI transmits data at a rate of 64 Kb/s over each of two *bearer* channels, also called *B channels*, which are dedicated to data transmission. Along with the two B channels, BRI uses one *data channel* called the *D channel*. The D channel handles all signaling information such as call setup requests. It transmits this information at a rate of 16 Kb/s.

The networking industry also refers to BRI service as 2B + D to denote the combination of the two B channels and one D channel. These three channels are combined in one physical twisted pair line that terminates at your premises and provides a total of 144 Kb/s bandwidth (Figure 4-2).

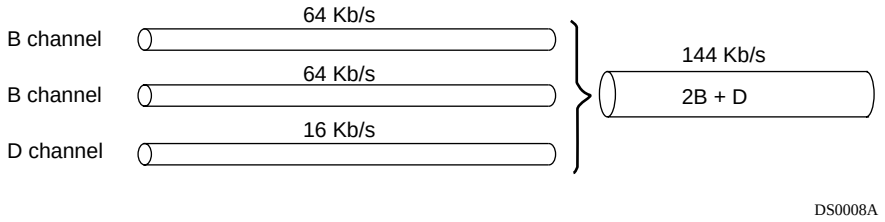


Figure 4-2. BRI Interface

Primary Rate Interface

PRI is the other ISDN service. In the United States, Canada, and Japan, PRI transmits data at a rate of 64 Kb/s over 23 B channels, and sends signaling information at a rate of 64 Kb/s over one D channel (23B + D). In Europe, PRI transmits data at the same rates with 30 B channels and one D channel (30B + D). PRI channels combine in two physical twisted pair lines.

There are two types of PRI service because the United States, Canada, and Japan derive the PRI transmission rates from the T1 standard, which operates at line speeds of 1.544 Mb/s. Europe and Australia, however, use the E1 standard, which operates at line speeds of 2.048 Mb/s.

D Channel

The D channel is integral to ISDN services. It provides out-of-band signaling, which means that the line that carries signaling information is separate from the line that carries data. Using out-of-band signaling, call setup information does not interfere with the data you send, and the result is more accurate communication.

The D channel also provides what the ITU-T (formerly CCITT) defines as supplementary services. These are extra services that you can purchase from your ISDN provider, for example, calling line ID, which enables you to determine the phone number of the incoming call.

Link Access Procedure-D

To perform call setup and signaling functions between your equipment and the ISDN network, the ITU-T defined recommendation Q.921, which outlines Link Access Procedure-D (LAPD), the data link layer protocol for the D channel. ISDN uses LAPD to establish a switched connection on a particular B channel. The B channel then allows data to travel between the two end points of that connection.

LAPD transmits information in frames. The fields in a LAPD frame contain addresses, control, and frame-check sequence information. The address and control information comprise the LAPD header, which sequences the packets and keeps them in the right order. The frame-check sequence allows the receiver of a frame to detect any errors that may have occurred during transmission.

Unlike other data link layer protocols, LAPD can handle multiple users on the same multiaccess interface. Figure 4-3 shows a LAPD frame.

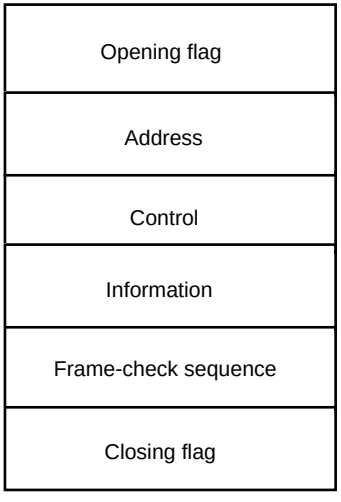


Figure 4-3. LAPD Frame

The fields in the LAPD frame are as follows:

- The **opening flag** and **closing flag** fields are High-level Data Link Control (HDLC) flags that separate one frame from the next.
- The **address** field contains two kinds of information. It provides a data-link layer entity; more specifically, a logical point that defines the data link between the user and the network. This portion of the address is the service access point identifier (SAPI). The address field also contains a number to identify the terminal equipment connected to the ISDN network. This is the terminal endpoint identifier (TEI). Either the network assigns a unique number to each device or you set this number at the device.
- The **control** field identifies the type of frame. This field also contains sequence numbering.
- The **information** field contains data to set up the link.
- The **frame-check sequence** is a cyclic redundancy check (CRC).

Call Control on the D Channel

ITU-T recommendation Q.931 outlines standards for out-of-band call control at the network layer for ISDN communication. The primary function of call control is to set up and take down ISDN calls on the B channels.

ISDN Interfaces

One of the key concepts in ISDN is a set of universal interfaces that allow you to purchase equipment and services from any ISDN provider. All providers can therefore implement ISDN similarly. ITU-T created a set of physical and logical interfaces to accomplish this goal.

ITU-T divides ISDN interfaces into two categories: functional groups and reference points. The following sections describe these two groups.

Functional Groups

Functional groups perform specific tasks that are necessary for you to access an ISDN network. These groups combine physical devices and functional points in an ISDN network, as follows:

- **Terminal equipment 1 (TE1)** -- ISDN-compatible devices, for example, the router with an ISDN/BRI module
- **Terminal equipment 2 (TE2)** -- Non-ISDN-compatible devices, such as analog phones and PCs
- **Network terminator 1 (NT1)** -- The point where the phone company's wires end at your premises
- **Network terminator 2 (NT2)** -- The point where any switching services occur at your premises
- **Line terminator (LT)** -- The point where your network lines terminate at the phone company's central office
- **Exchange terminator (ET)** -- Located at the phone company's central office, it performs the switching exchange functions
- **Terminal adapter (TA)** -- Provides ISDN connectivity to non-ISDN devices

Reference Points

Reference points, also called *interfaces*, bring two functions together. A reference point may be physical, along the ISDN line, or merely a conceptual point where functions merge. There are four main reference points in an ISDN network:

- **R reference point** -- The point between the non-ISDN device and a terminal adapter. It is the boundary between your equipment and the ISDN network.
- **S reference point** -- The point between the terminal equipment and the switching device at your premises.
- **T reference point** -- The point between your switching device and the subscriber side of the local loop, that is, the wire between your phone and the phone company's central office.

Note: Any device that can connect to an S reference point can connect to a T reference point, because the devices are the same electrically.

- **U reference point** -- The point between the NT1 (where the phone company's line ends at your premises) and the phone company's central office. It is where the subscriber side and network side of the local loop meet.

  This point is different in North America than in Europe. In North America, the subscriber side of the local loop includes the NT1, so the U point is further out on the network. In Europe, the NT1 is part of the service provider's side or network side of the local loop, so the S/T point is where the subscriber and the network meet.

Figures 4-4 and 4-5 show two ISDN networks with functional groups and reference points.

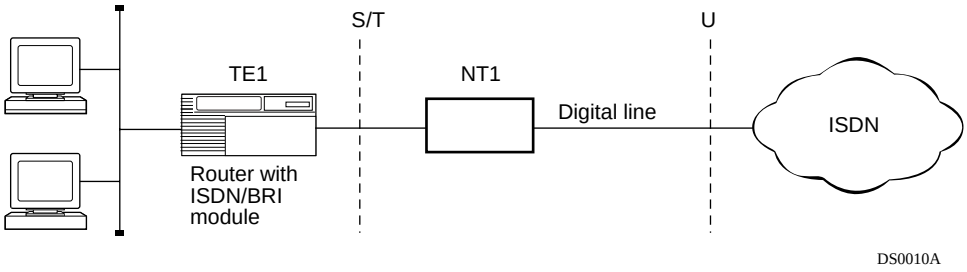


Figure 4-4. Reference Points and Functional Groups for Devices

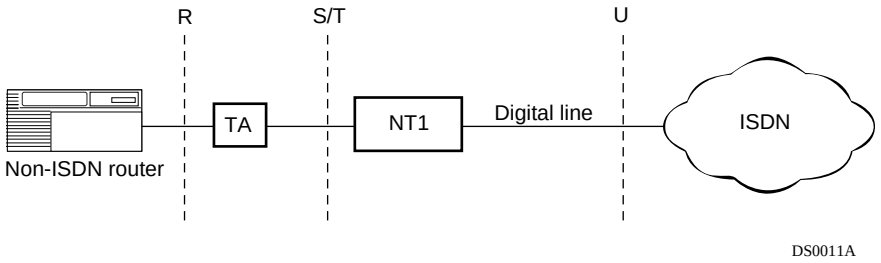


Figure 4-5. Reference Points and Functional Groups for Non-ISDN Devices

For More Information About ISDN

For detailed information about ISDN protocol design and implementation, refer to the following:

Deming, R. *ISDN -- The Network Architecture of the Future.* Bell Communication Research Technical Education Center, New Jersey.

Goldstein, F. *ISDN in Perspective*. Reading, Mass.: Addison-Wesley, 1992.

Kessler, G. *ISDN*, 2d ed. New York: McGraw-Hill, 1993.

Motorola University Press. *The Basics Book of ISDN*. Network Information Center (NIC), SRI International. Reading, Mass.: Addison-Wesley, third printing, January 1994.

Newton, H. *Newton's Telecom Dictionary*, 10th ed. New York: Flatiron Publishing, 1996.

Stallings, W. *ISDN and Broadband ISDN*, 3rd ed. New York: Macmillan, 1995.

Stallings, W. *ISDN: An Introduction*. New York: Macmillan, 1989.

Chapter 5
Implementation Notes for All Dial Services

This chapter describes the Nortel Networks implementation of all three dial services. It includes the following information:

Topic	Page
Point-to-Point Protocol	5-1
WAN Encryption Protocol	5-6
Asynchronous PPP	5-6
RADIUS	5-9
ISDN Services	5-10

Point-to-Point Protocol

You can use Point-to-Point Protocol (PPP) across dial lines for any dial service.

PPP Authentication

Dial circuits use a PPP identification mechanism to identify the calling router to the called router. The identification process takes place during PPP link negotiation, which occurs before the routers establish a connection to send protocol data.

The identification mechanism relies on one of two PPP authentication protocols: Challenge Handshake Authentication Protocol (CHAP) or Password Authentication Protocol (PAP). CHAP and PAP implement a security feature that identifies peer routers to one another. CHAP is the default authentication protocol.

Enabling the called router to dynamically identify the calling router lets a single dial interface (ISDN or modem) at a remote router be the connection point to multiple routers.

To set up authentication, you must configure the router's caller resolution table (see Chapter 16 "Customizing Caller Resolution"). For more information about CHAP and PAP, see *Configuring PPP Services*.

Types of Authentication

You can configure *one-way authentication* or *two-way authentication*. Two-way authentication enables both routers to authenticate each other. One-way authentication enables only the called router to authenticate the remote peer.

Two-Way Authentication

Figure 5-1 shows an example of two-way authentication.

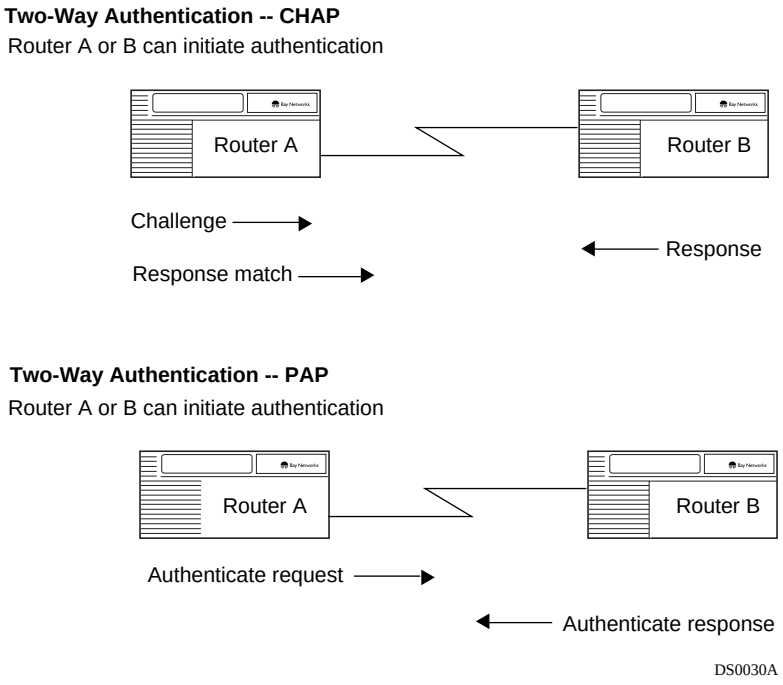


Figure 5-1. Two-Way Authentication

For CHAP, Router A initiates a CHAP challenge and Router B responds. Router A responds with a response match and the connection is activated. Router B can also initiate a CHAP challenge. For PAP, Router A sends an authenticate request to Router B. Router B sends an authenticate response and then activates the connection. Router B can also initiate an authenticate request.

Both Routers A and B can use PAP and CHAP in a single line pool. If Router B rejects the CHAP challenge, and Router A has the PAP Fallback parameter enabled, Router A switches to PAP and retries the authentication.

One-Way Authentication

Figure 5-2 illustrates one-way authentication. For CHAP or PAP, the calling router does not try to authenticate the called router, but it does recognize and respond to CHAP challenges or PAP authentication requests from the called router. The called router does authenticate the calling router. Using one-way authentication, the router can communicate with other devices that may not support two-way authentication.

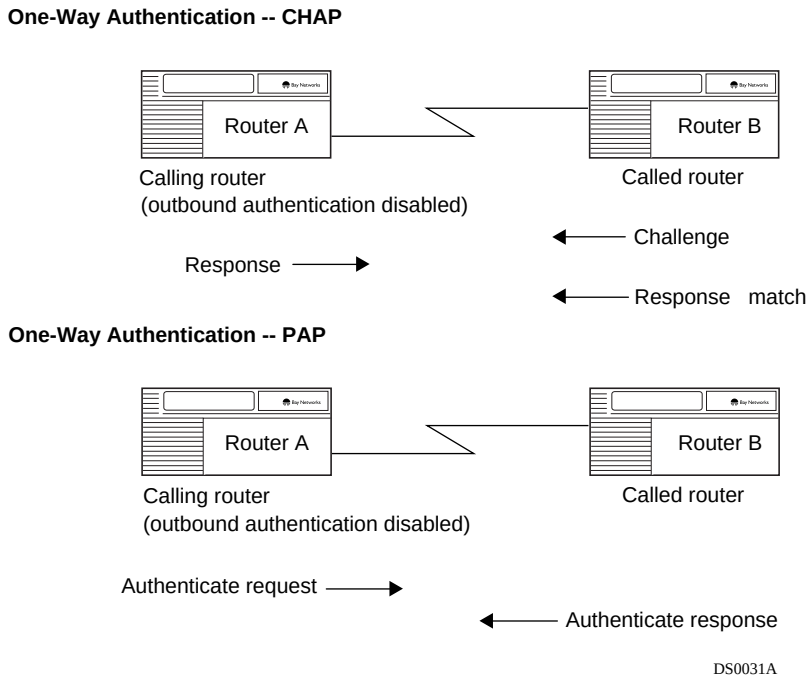


Figure 5-2. One-Way Authentication

The receiving router can use PAP and CHAP in a single line pool. If router A rejects the CHAP challenge, and router B has the PAP Fallback parameter enabled, router B switches to PAP and retries authentication. If PAP Fallback is not enabled, the connection is activated.

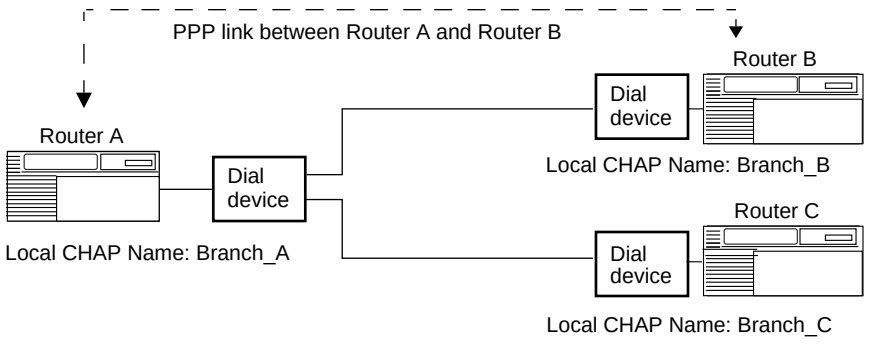
Configuring the Type of Authentication

Configuring outbound authentication determines the type of authentication the router uses. You enable outbound authentication to use two-way authentication and disable it to use one-way authentication. To set this parameter, see the appropriate chapter for configuring circuits.

Using CHAP Names and PAP IDs for Authentication

Authentication occurs before the routers establish a connection. The router at one or both ends of the connection must agree on the CHAP name and secret or PAP ID and password so PPP can identify the caller and activate the correct circuit.

Figure 5-3 shows an example of routers using CHAP for authentication. PAP works in a similar way. This example uses two-way authentication.



Router A
Caller resolution table

Caller Name	Local Circuit
Branch_B	27
Branch_C	13

Router B
Caller resolution table

Caller Name	Local Circuit
Branch_A	5

DS0019A

Figure 5-3. Routers Using CHAP for Authentication

In Figure 5-3, routers A and B each have a caller resolution table that maps local circuits to the names of remote callers.

Router A calls router B. When router A makes the call, it places its local CHAP name, Branch_A, and CHAP secret in the CHAP challenge message. Router B's caller resolution table shows Branch_A assigned to Circuit 5, the connection to router A. When router B receives the call, it looks in its table, confirms router A's CHAP name (referred to as the Caller Name in the table) and CHAP secret, and activates Circuit 5.

Conversely, when router B calls router A, it places its local CHAP name, Branch_B, in the CHAP challenge message. Router A looks in its table, verifies that router B is an authorized caller, and brings up circuit 27, the connection to router B.

PAP is similar to CHAP, but PAP uses a PAP ID and password as part of the identification process. The calling router places its PAP ID and password in the authenticate request to the called router. The called router first looks in the caller resolution table to find the PAP ID (referred to as the Caller Name in the table). If the router finds the PAP ID, it then checks the table for the password associated with the ID and compares it to the password in the authenticate request. If the passwords match, the router brings up the circuit.

To configure the caller resolution table, see Chapter 16, "Customizing Caller Resolution." For more information about CHAP names and PAP IDs, see *Configuring PPP Services.*

WAN Encryption Protocol

You can configure the WAN Encryption Protocol (WEP) to work with all three dial services. Nortel Networks data encryption services enable you to protect sensitive traffic on your network. Encryption prevents unauthorized persons from reading, changing, or replaying data that travels between Nortel Networks routers.

To configure WEP for a PPP or frame relay circuit (leased or dial), see *Configuring Data Encryption Services.*

Using Encryption with Dial Backup

If you configure encryption to work with dial backup service, encrypted data travels over the backup circuit if the primary line fails. You do not have to configure WEP over the backup circuit because the backup circuit takes the configuration of the primary circuit. Encryption works with any PPP or frame relay primary and backup circuit combination. See “Dial Backup Service” on page 1-14 for a list of these combinations.

If PPP is the protocol for the backup circuit, ensure that the parameter RFC1661 Compliance (Site Manager) or **mru-compliance** (BCC) is set to the default, Enable, for encryption to work successfully.

To configure RFC 1661 compliance with Site Manager, see *Configuring PPP Services*. To configure RFC 1661 compliance with the BCC, see “Disabling MRU Compliance” on page 9-7.

Asynchronous PPP

Asynchronous PPP provides communication for asynchronous interfaces on the AN, ASN, and ANH (using the Dual Sync Net Module); ARN (using any Serial Expansion Module); and BLN and BCN (using the Octal Sync Link Module). There are several advantages to asynchronous communications:

- **Low cost** -- Analog lines are less expensive than high-speed digital lines. Asynchronous modems are less expensive than synchronous modems. You can also dial directly into the router without using a terminal server or other port-concentration devices.
- **Effective use of router hardware** -- You can use an available serial port on the router for a dial-up application.

- **Line availability** -- Analog lines are available in most locations, enabling you to dial in from any remote location.
- **Throughput** -- With the V.34 standard, throughput for asynchronous modems is 28.8 Kb/s. Using the V.42bis compression standard, throughput can be higher.

Figure 5-4 shows a network that uses asynchronous PPP over modem lines.

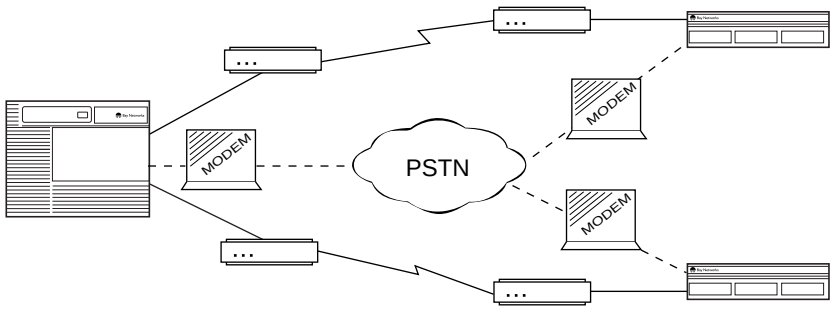


Figure 5-4. Using Asynchronous PPP over Modem Lines

Using low-cost asynchronous modems makes asynchronous PPP ideal for customers with small networks who are trying to lower expenses.

All dial services can use asynchronous PPP for connections between two routers. Only demand and backup service can use asynchronous PPP for connections between a router and a terminal server.

All protocols that can operate with PPP, CHAP, and PAP can operate with asynchronous PPP. Asynchronous connections also support software and hardware data compression.

To configure asynchronous PPP, see “Modifying the WAN Interface Type” on page 10-2.

Configuring Modems for Asynchronous PPP Interfaces

Using Site Manager, configuring modems is simplified for asynchronous dial-up connections that use Hayes signaling. The router provides the following list of commonly used modems that you can choose for your network:

- US Robotics Courier V.Everything
- Hayes Optima 288
- Cardinal MVP 288XF
- Supra 288 Fax Modem
- Zoom V.34X
- Microcom DeskPorte Fast
- BayStack ARN V.34 Modem Adapter Module
- MultiTech Multimodem II MT1432
- Paradyne Comsphere 3820
- Motorola Codex 3261
- Boca V.34 Modem MV.34E

When you select a modem from the list, the AT initialization string is set automatically, as well as the speaker volume, speaker control, and number of rings to answer. (You can modify these default settings.) If your modem is not on the list, you can configure a custom modem and AT initialization command. The AT initialization command is required for custom modems. Appendix E lists the AT initialization commands for the ARN. Because your modem may use a different set of commands, consult the manual for your modem.

For the BCC, the **modem-type** default is custom. We recommend that you accept the default value and then specify a modem initialization string.

The BayStack™ ARN router has an optional V.34 Modem Adapter Module that requires you to configure an AT initialization command whether the interface is synchronous or asynchronous.

For instructions on modifying your modem configuration, see Chapter 10, “Customizing Modem Lines.”

RADIUS

As networks grow to accommodate more remote dial-in users, network security, network use, and billing become more difficult to manage. Remote Authentication Dial-In User Service (RADIUS) centralizes security and accounting information, improving security and providing a solution that adapts to the changing needs of the remote user and service providers.

RADIUS operates between a client and a server, with the router acting as the RADIUS client. The dial service enables the router to activate a dial-up connection for RADIUS calls.

Using the BCC or Site Manager, you can configure RADIUS on all router platforms except the System 5000. You can configure RADIUS for the System 5000 using the BCC.

To learn more about RADIUS, see *Configuring RADIUS*.

RADIUS Authentication Services Using VSAs

RADIUS clients must have a way to authenticate remote callers. For RADIUS clients that use a dial service, you identify remote callers by configuring vendor-specific attributes (VSAs) on the RADIUS server. These attributes identify the remote router and enable you to store customized profiles for that router. For more information about VSAs, refer to Request for Comments (RFC) 2138 and RFC 2139.

The fields within the VSA attribute identify this router's vendor and set restrictions or enable certain privileges. The Nortel Networks ID is 1584.

The only required VSA is **Annex-Local-IP-Address**, which specifies the IP address of the local port. This VSA must match the IP address of the interface receiving the call.

When a call comes in that needs authentication, the router first checks its caller resolution table for an entry that identifies the remote caller.

- If the caller is authorized, the local router maps the caller to a local circuit, and then activates that circuit.

- If the caller is not in the caller resolution table, and RADIUS is configured, a request is sent to the RADIUS server for authentication.

Note: Do not configure the remote router in the caller resolution table. If you do, the local router, which is the RADIUS client, will not access the vendor-specific attributes.

ISDN Services

A router with built-in ISDN capability is a TE1 device, which is an ISDN-compatible device. This means that the router provides the S/T interface, which defines the boundary between the user and the network. (The ARN also provides the U interface, which includes an integral NT1 interface.) The NT1 interface defines the point at which the service provider's wires terminate at your site.

For BRI service, the S/T interface follows the standards outlined in ITU-T recommendation I.430, the physical layer protocol that defines the S/T interface. For PRI service, the interface follows ITU-T recommendation I.431.

You have an S interface only if an NT2 device is present. An NT2 is a switch at your site that connects your TE1 and TE2 equipment to the network.

Figure 5-5 shows the router in a sample ISDN network.

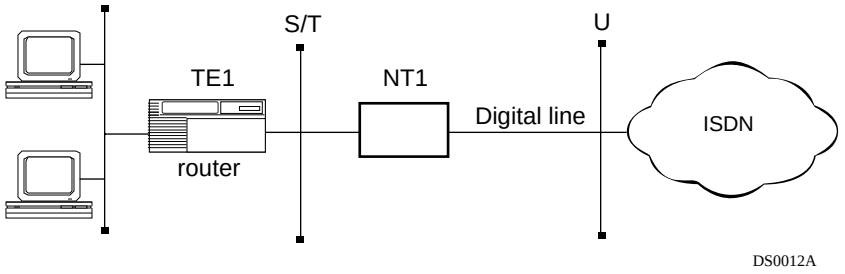


Figure 5-5. Router in an ISDN Network

The following sections explain ISDN operation on your router.

BRI Service on the AN, ANH, ASN, and ARN

The AN, ANH, ASN, and ARN support the BRI standard for ISDN using an integrated ISDN/BRI net module.

Note: The ARN can use only three B channels. If you select 2B + D service for one BRI interface, you must use 1B + D service for the second interface.

The ISDN/BRI module allows you to connect directly to the ISDN network instead of connecting via a terminal adapter. With BRI, you reduce equipment costs and simplify connections to an ISDN switch.

The BRI implementation supports all three dial services. In addition, the implementation supports an ISDN leased-line application (for Germany and Japan only). Subsequent chapters in this guide describe how to configure each service to connect to an ISDN network.

B Channel Support

In keeping with the BRI standard, each port on the ISDN/BRI module provides two 64 Kb/s B channels for data transmission, allowing communication with two remote locations simultaneously.

D Channel Support

The router supports full 16 Kb/s D channel signaling and call setup and teardown between the router and ISDN switch. The D channel implementation complies with the ITU-T (formerly CCITT) 1988 recommendations Q.921 and Q.931, and provides signaling support for the following countries:

- INS-64, KDD, and NTT for Japan
- TS013 for Australia
- National ISDN 1, AT&T 5ESS Custom, and NT DMS-100 Custom for the United States and Canada
- Swissnet 3 for Switzerland
- NET3 for Austria, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom

Nortel Networks routers do not support data transmission across the D channel.

BRI Leased-Line Operation for Germany and Japan

For BRI service in Germany and Japan, you can configure a permanent point-to-point ISDN connection over a B channel, without having to use the D channel to dial the call. This connection operates like a leased line and is useful when ISDN service providers do not use the D channel.

Leased-line operation supports PPP, Nortel Networks Standard, and frame relay.

You select leased-line operation when you configure the application mode, that is, the type of BRI service, for the BRI interface. To set the application mode using Site Manager, see “Configuring BRI Lines” on page 2-9. To set the application mode using the BCC, see “Configuring BRI Lines” on page 3-12.

To modify the leased-line configuration, see “Modifying the BRI and PRI Modes of Operation” on page 11-2.

BRI Subaddresses

The ITU-T specifies that one S/T interface can have eight different TE devices, for example, routers. However, the service provider may assign only one phone number for the customer side of the local loop. To determine the specific destination of the call, the router uses a *subaddress*.

Each router has an assigned subaddress for which it will accept calls. The subaddress must be part of the incoming call setup message sent to the router. Based on the subaddress, the router determines whether it is the intended receiver. If not, the router ignores the call.

Floating B Option for the AN and ANH

If your ISDN service provider offers only 2B + D service, the floating B option for the AN and ANH enables you to use only one B channel for dial service applications. Floating B is an alternative if you cannot purchase 1B + D service.

If your service provider offered only 2B + D service, the AN and ANH CPU would use two of its four serial communication controllers (SCCs) for the two B channels, one SCC for the Ethernet link, and one SCC for a synchronous link. Using the floating B option, you use only one B channel at a time, freeing up an SCC for an additional synchronous link.

You can use floating B if your network integrates an ISDN dial backup connection with network devices that send protocol traffic such as SDLC or X.25. This type of application requires the following interfaces:

- One synchronous interface for SDLC or X.25 traffic
- One synchronous interface for the primary link to the backbone network
- One ISDN B channel for the dial backup link

If you use 2B + D service without configuring floating B, the AN provides only one synchronous interface, so you cannot integrate the dial service with other network applications. However, by configuring floating B, you can configure two synchronous interfaces: one Ethernet link and one B channel. The router software maps whichever B channel is in use to a single SCC.

To implement the floating B option, configure the port application mode for that option (see Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC”). The router makes the necessary adjustments so that only one B channel is available.

PRI Service on the ASN, BLN, and BCN

The ASN, BLN, and BCN provide PRI service on the following modules:

- Single or Dual Port Multichannel T1 Link Module (BLN and BCN)
- Dual Port Multichannel T1 Net Module (ASN)
- 120-ohm Single Port MCE1-II Link Module (BLN and BCN)
- 120-ohm Single or Dual Port MCE1-II Net Module (ASN)
- QMCT1 Link Module (BLN and BCN)

PRI allows you to connect directly to the ISDN network instead of connecting via a terminal adapter. PRI is a cost-effective solution when the number of BRI channels required for an application exceeds the cost of a single PRI line. The cost savings depend on each country’s tariffs.

All three dial services can use PRI connections. Subsequent chapters in this manual describe how to configure each service to connect to an ISDN network.

B Channel Support

In keeping with the PRI standard, each port on the MCT1 Link Module provides 23 B channels operating at 64 Kb/s for data transmission. Each port on the MCE1 Link Module provides 30 B channels operating at 64 Kb/s for data transmission.

D Channel Support

The router supports full 64 Kb/s D channel signaling and call setup and teardown between the router and ISDN switch. The D channel implementation complies with the ITU-T 1988 recommendations Q.921 and Q.931, and provides signaling support for the following switches:

- Net5 for Austria, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom, Switzerland, Finland, Greece, Iceland, Ireland, Luxembourg, and Portugal
- AT&T 5ESS and 4ESS Custom and DMS-100 Custom for the United States
- DMS-100 Custom for Canada
- NTT and KDD for Japan
- TS014 for Australia

Nortel Networks routers do not support data transmission across the D channel.

Selective PRI Service

Your ISDN service provider may offer a service option that provides only a fixed number of PRI B channels out of the full complement of B channels. This subset of channels is usually offered at an economical rate.

The ISDN service provider limits the number of channels by keeping the unavailable channels busy. Consequently, the router can use only what is available.

If you select this option, you must select only those channels available for communication. For example, if the provider offers channels B1 through B6, you configure only channels 1 through 6. You should not select all the B channels; your configuration should match your service.

PRI Multirate

PRI multirate enables you to group B channels in multiples of 64 Kb/s to dynamically allocate bandwidth on a call-by-call basis. Depending on how many B channels you combine, the bandwidth can range from 128 Kb/s to 1472 Kb/s. This allows you to choose the most suitable bandwidth for an application.

Applications such as dial backup and video conferences benefit from the flexibility of multirate service. These applications require more than one B channel but not the full complement of B channels for PRI. Also, ISDN service providers offer multirate service at lower tariffs than other ISDN services. Multirate is especially useful when frame relay is used across an ISDN line. You can group multirate dial lines to provide backup connections if the primary connection fails.

Multirate service is available for all three dial services on the ASN, using only the Dual MCT1 Net Module, and on the BLN and BCN, using only the Dual or Single Port MCT1 and QMCT1 Link Modules. The following switches for North America and Canada support multirate service:

- AT&T 5ESS
- AT&T 4ESS
- DMS-100

For these switches, you can group from 2 to 23 B channels, supplying bandwidth from 128 Kb/s to 1472 Kb/s.

Placing Multirate Calls

Both ends of a connection must support multirate for it to work. You enable multirate and specify the transmission rate of each multirate call when you configure an outgoing phone number for a circuit. (For specific instructions, see “Enabling PRI Multirate” on page 15-16.) Each multirate call can operate at a different transmission rate. You determine the transmission rate by specifying the number of B channels the circuit can use for a phone number. The greater the number of B channels, the faster the transmission rate because the circuit has more bandwidth.

You can place several multirate calls over the same PRI connection; however, the total number of B channels for each call cannot exceed the number of lines in the pool or the number of lines supported by the network switch. If there are no available B channels in the line pool, the call fails.

Call setup across the D channel is simple. You set up a call only once, regardless of how many B channels are in use.

Note: If you enable multirate calls across a bandwidth-on-demand circuit, you must configure each line's external clock speed. Line speed is critical to balancing traffic across a multilink bundle, which is a group of dial-up lines that help reduce congestion on a leased line.

Incoming Call Filtering

Incoming call filtering is a security feature that works with the ISDN caller ID service. Incoming call filtering lets the router filter incoming calls based on the calling party's phone number. This feature is available for BRI and PRI service.

Caution: To use incoming call filtering, you must purchase caller ID service from your ISDN service provider. If you enable incoming call filtering without caller ID service, the router rejects all incoming calls.

The router filters incoming calls based on a list of phone numbers that you specify in an incoming phone list. The phone number you enter must exactly match the phone number that the switch sends to the router. If the phone number is included in the router's list, the router accepts the call. If not, the router rejects the call. This ensures that only authorized users have access to your network.

To enable incoming filtering, see "Enabling Incoming Call Filtering" on page 11-8. You must also create an incoming phone list for incoming filtering. For instructions, see "Creating an Incoming Phone List (ISDN Only)" on page 15-19.

Rate Adaption

Rate adaption enables the router to accommodate data transmission at a rate of 56 Kb/s over a 64 Kb/s B channel. Nortel Networks supports only 56 Kb/s adapted to 64 Kb/s using the ITU-T V.110 type of rate adaption. You can enable rate adaption for BRI and PRI service.

For incoming calls, the router automatically adapts the data received at 56 Kb/s to the 64 Kb/s channel, based on information in the call setup packet. For outgoing calls, the router sets the rate to either 64 Kb/s or 56 Kb/s, depending on how you configure the rate adaption parameters. To determine which rate to select, ask your service provider for information about the network and connecting to the destination device.

For information about configuring rate adaption, see “Modifying the Adaption Rate” on page 11-9 and “Modifying a Call’s Adaption Rate” on page 15-12. The following two examples describe how rate adaption works.

Example 1

Between two end nodes there are seven switches. One switch uses a 56 Kb/s trunk line (Figure 5-6). To accommodate this switch, the router sends data at 56 Kb/s over the 64 Kb/s line that connects the switch to the network. The router drops one of the eight bits of data from each byte and sends only seven bits of data at a time.

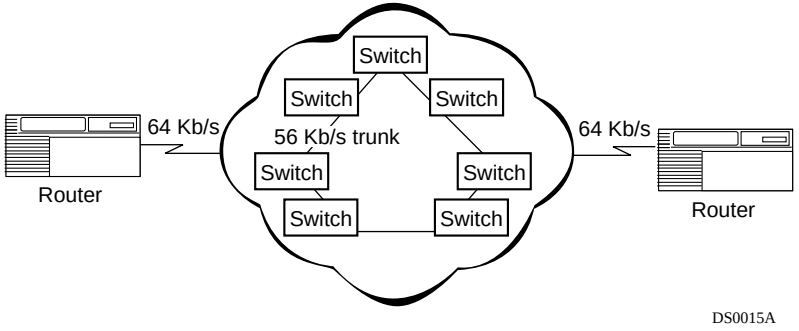


Figure 5-6. Rate Adaption for a Network with a 56 Kb/s Trunk Line

Example 2

For a connection between an ISDN and switched 56 Kb/s network (Figure 5-7), the router adapts the data rate for the outgoing call to 56 Kb/s to match that of the destination device, which can handle data only at 56 Kb/s. To do this, you set the adaption rate for the outgoing phone number to 56 Kb/s.

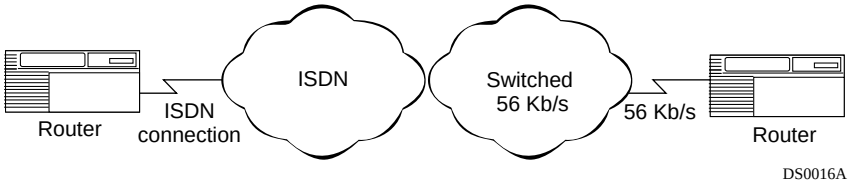


Figure 5-7. Rate Adaption for a Switched 56 Kb/s Network

X.25 Service over an ISDN D Channel (BRI Only)

For routers used in France and Germany, you can send X.25 packets over an ISDN D channel to an X.25 network. This feature reduces the cost of X.25 network access because you do not have to use expensive leased lines. While the D channel is in use, you can use the B channels for other dial service applications.

This feature is based on ITU-T recommendation X.31, which specifies how an X.25 DTE communicates with an ISDN network. With the router's ISDN functionality, you dial into the ISDN network and send X.25 packets. These packets are directed to the packet handling (PH) function in the ISDN network, which processes an X.25 call and acts as a gateway between the ISDN network and the X.25 network.

X.25 service over the D channel is available only for BRI interfaces on the AN, ANH, ASN, and ARN using the single or quad ISDN/BRI module. A minimum of 8 Mb of memory is required to use this feature on these routers.

Recommendation X.31 states that packets sent over the D channel can travel at a maximum of 9600 b/s. If you use a higher baud rate, you lose data.

X.25 calls are made to the destination device using X.25 addresses in the call request message. The router uses E.164 addresses for communication across the D channel to the ISDN network, and uses X.121 addresses to call an X.25 network directly. You specify the address in the X.25 packet configuration.

One method of implementing X.25 over the D channel is to configure PDN service. Another method of implementing X.25 over the D channel is to use IPEX single-node switching.

For information about X.25 packet configuration, PDN service, and IPEX single-node switching, see *Configuring X.25 Services.*

Figure 5-8 shows how X.25 is implemented over the D channel using PDN service.

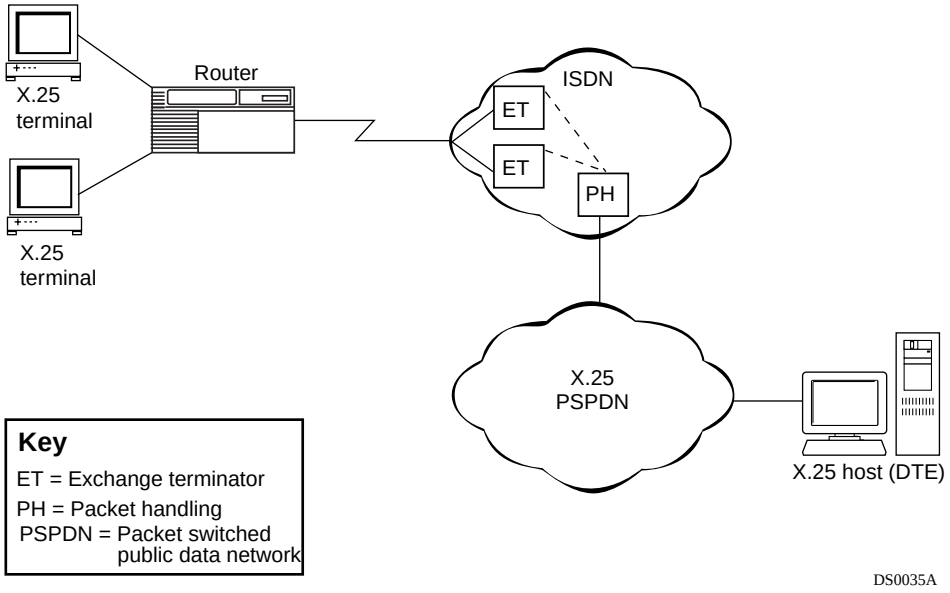


Figure 5-8. X.25 over the D Channel

Configuring X.25 Service over the D Channel

You enable the X.25 over the D Channel feature for each BRI line. You can also configure multiple D channel interfaces with X.25. For configuration instructions, see “Configuring X.25 over a D Channel (BRI Only)” on page 11-11.

Using the ping Command for ISDN Connections

To check the availability of a remote device in an ISDN network, you can use the **ping** command. The **ping** command sends an Internet Control Message Protocol (ICMP) echo request to a remote address that you specify. You can issue this command by using the Site Manager Administration option, Ping from Router; by using the Technician Interface; or by using the BCC.

Call setups for dial connections require more time than setups for ISDN connections. When you ping a remote device using the default timeout value, 5 seconds, it may fail because the router does not wait long enough for a response from the remote device. Therefore, you may want to increase the timeout value so that the router will allow enough time for a response.

For information about using the **ping** command, see *Configuring and Managing Routers with Site Manager*, or *Using Technician Interface Software.*

Chapter 6
Dial-on-Demand Implementation Notes

This chapter contains the following information about dial-on-demand:

Topic	Page
Bay Command Console	6-1
Standby Circuits	6-2
Callback	6-5
Demand Circuit Groups	6-7
Managing Broadcast Traffic over Demand Circuits	6-8
Data Compression	6-13
PPP Multilink	6-14
Protocol Prioritization	6-15

Bay Command Console

You can configure dial-on-demand service using the Bay Command Console (BCC). The BCC is a command-line interface for configuring Nortel Networks devices. In BCC configuration mode, you can create a customized configuration and modify this configuration.

In configuration mode, you navigate through the configuration tree hierarchy to objects that enable you to create dial-on-demand service. To navigate through the configuration hierarchy and learn what you can configure at each level, enter a question mark (**?**) or the **help tree** command at any prompt.

To learn more about the BCC, see *Using the Bay Command Console (BCC).*

Standby Circuits

The expansion of enterprise networks to remote branch sites requires reliable access to these sites. Therefore, it is important to have more than one connection to the remote sites in case a primary connection fails.

To provide additional connections, you can use *standby circuit*s. A standby circuit is a special type of demand circuit that gives the router another path to the destination. The destination can be a different interface at the primary circuit's original site, or an entirely different site.

Standby circuits support asynchronous (RS-449), synchronous (RS-449, V.35, RS-422, and X.21), and ISDN interfaces. PPP is the only data link layer protocol that you can configure over a standby circuit; you cannot use frame relay.

Comparing Standby Circuits with Dial Backup Circuits

Both standby circuits and dial backup circuits can back up failed primary circuits; however, they differ in the following ways:

- Each standby circuit has a unique configuration; it does not adopt the primary circuit's configuration. In contrast, most dial backup circuits inherit the primary circuit's configuration.

  This unique standby configuration offers flexibility when setting up other paths to remote sites. For example, you may want the standby circuit to have a different destination than the primary circuit, or you may enable compression on the standby circuit but not on the associated primary circuit.

- Standby circuits let you control when the router switches from the standby circuit back to the recovered primary circuit. You do not have this option with dial backup circuits. In dial backup configurations, the router terminates the backup circuit when the primary circuit recovers. For example, to ensure the stability of a recovered primary circuit before bringing down the standby circuit, you can delay the return of data to the primary circuit.

- Standby circuits support PPP multilink.

  You can assign a bandwidth-on-demand pool to the hot standby circuit to relieve congestion. Bandwidth-on-demand connections use PPP multilink, which lets the router use multiple dial-up lines simultaneously to transmit data. You do not have this option with dial backup circuits.

If you associate a bandwidth-on-demand pool with a hot standby circuit, the router monitors the hot standby circuit for congestion. If the circuit becomes congested, the router activates lines from the bandwidth-on-demand pool until congestion is relieved.

For maximum flexibility and control when setting up alternative connections, and for quick responses to failed primary circuits, standby circuits are the best choice. However, for more straightforward applications, where you do not need to configure an alternative site for the backup connection, dial backup circuits are more suitable. Either option ensures that critical data reaches its destination.

How Standby Circuits Work

There are two types of standby circuits:

- **Hot standby** -- A hot standby circuit backs up a failed primary circuit. When the primary circuit fails, the router activates the hot standby circuit to provide another route to the destination. A hot standby circuit can connect to another standby circuit, a demand circuit, or a demand circuit group.

  Hot standby circuits can support the following types of primary circuits:

  - Single leased PPP circuit
  - Single leased Nortel Networks Standard circuit
  - PPP multilink circuit (Site Manager configurable only)
  - PPP multiline circuit (Site Manager configurable only)
  - Frame relay primary circuit with a direct mode PVC

  Hot standby circuits can back up primary circuits on any slot, not just the slot on which the hot standby circuit resides. For example, if a primary line on Slot 4 fails, the router can activate a standby connection from Slot 3.

- **Standby** -- A standby circuit has no relationship with the primary circuit. It does not back up a primary circuit if that circuit fails. Instead, a standby circuit answers incoming calls destined for it. A standby circuit can also carry data when you activate it manually.

The router activates a standby circuit when:

- A primary circuit fails.

  The router activates a hot standby circuit when the primary circuit fails. The hot standby takes over data transmission. To determine whether a primary circuit failed, the router relies on Breath of Life (BofL) messages for PPP primary circuits and A-bit notification for frame relay primary circuits.

  When you associate a PPP primary circuit with a hot standby circuit, the router automatically enables BofL for the primary circuit, so be sure to enable BofL on the other side of the PPP primary circuit. This does not apply to frame relay primary circuits.

- A call is designated for the standby circuit.

  The router activates a standby circuit only when the remote router calls the host router over a standby circuit.

- You activate a standby circuit manually.

Typically, circuits at the remote site will be hot standby circuits, while at the central site, they will be regular standby circuits. Configuring hot standby circuits for the remote router means that the remote router monitors the status of its primary connections, which is easier for the remote router than for the central router because there are fewer connections.

Standby circuits support standard demand circuit features such as multilink, unnumbered interfaces, dial-optimized routing, and outbound filtering.

Balancing Traffic Between a Primary Circuit and a Hot Standby Circuit

When a hot standby circuit is active, the routing protocol activates and finds an alternative route to the destination. When the primary circuit recovers and resumes data transmission, the routing protocol deactivates. This is referred to as a *failback* to the primary circuit.

You can control the failback to the primary circuit manually or automatically. One advantage of controlling failback is that you can delay the return of traffic to the primary circuit. This lets the primary circuit stabilize before it resumes transmission of critical data.

The following configuration choices enable you to manage traffic between the primary circuit and the hot standby circuit:

- RIP or OSPF precedence and cost parameters

  The router sends traffic across the circuit with the better cost route. If the better route is the hot standby circuit, traffic continues across this circuit even if the primary circuit recovers. Conversely, traffic will resume across the primary circuit if that is the better route. See *Configuring IP, ARP, RARP, RIP, and OSPF Services* for information about RIP and OSPF.

- Standby Failback Mode parameter

  This parameter specifies the method that the router uses to deactivate the standby circuit and return to the primary circuit. Using this parameter, you can control the failback to the primary circuit automatically or manually.

- Failback Time parameter

  This parameter specifies the delay before returning to the recovered primary circuit. The routing-level configuration takes precedence over the value of this parameter. If the primary circuit has a better cost route, traffic returns to the primary circuit, regardless of the delay specified by this parameter. If the hot standby circuit has a better cost route, the router uses this circuit until the failback timer expires.

Callback

Callback is a dial-on-demand feature for use between two peer routers, such as a central router and a remote router, over a PPP circuit. You cannot use callback with frame relay demand circuits or demand circuit groups.

With this feature, you can configure a router to call back an incoming caller. You can configure callback across any demand circuit, including those configured for bandwidth-on-demand service.

Callback offers the following advantages:

- Reduces tariffs because you can place calls using the lowest-cost path
- Secures access for authorized callers only
- Consolidates accounting of phone charges

Figure 6-1 shows how callback works.

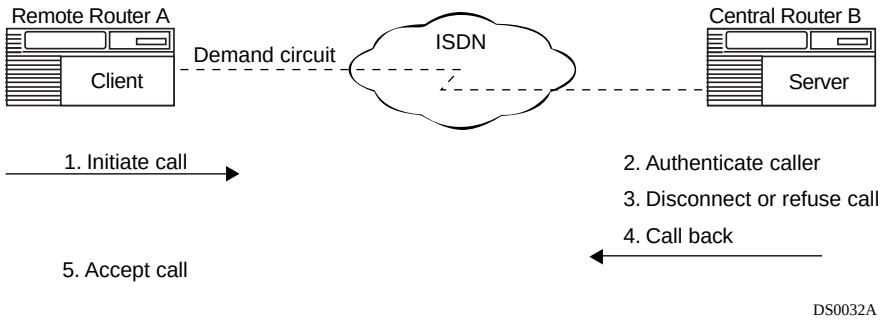


Figure 6-1. Example of Callback over a Demand Circuit

Remote router A places a call to central router B. Router B determines whether the caller is authorized and, if so, terminates the initial call. Router B then places a return call to router A.

Configuring Callback

Callback operates on a per-demand-circuit basis. You enable callback by configuring the callback mode parameter. This parameter assigns each end of a callback circuit the role of *server* or *client*. If you do not want to use the callback feature, you accept the default callback mode, Inactive.

The server responds to each incoming call from the client, and either authenticates the call using CHAP or PAP or identifies the caller using the incoming filtering feature. The server disconnects or refuses the call, then redials the client using one of the following options:

- The outgoing phone list

  The outgoing phone list is a user-defined list containing the phone numbers of remote routers. Each number in the outgoing phone list is associated with a specific circuit.

- Caller ID, also called Automatic Number Identification (ANI)

  Caller ID is an ISDN service that you purchase from an ISDN service provider. When you purchase caller ID, the phone number of the caller is placed in the call setup message. The network switch must also support caller ID.

After placing the initial call, the client waits for a return call from the server. A user-specified parameter determines how long the client waits for a response. During this time, the client will not place an outgoing call to any other destination.

To set the callback configuration parameters, see “Enabling Callback” on page 12-31.

Demand Circuit Groups

A demand circuit group is a set of demand circuits that share the same user-defined unnumbered protocol configuration. An unnumbered protocol configuration does not restrict the router to a specific destination address. Instead, it enables the router to use any circuit in the group for an incoming call, eliminating the need to configure a unique demand circuit for each remote node in the network. One demand circuit group supports many remote routers, thereby reducing the configuration tasks for a large network.

Demand Pools and Demand Circuit Groups

Like individual demand circuits, a demand circuit group is associated with an existing demand pool. The number of circuits in the demand circuit group must be less than or equal to the number of lines in the demand pool. If you change the number of lines in a demand pool, you must increase or decrease the number of demand circuits in the group accordingly.

When the router activates a line from the demand pool, the circuits in a demand circuit group also become available. The router does not bring up the circuits until it receives an incoming call. Demand circuit groups can only receive calls.

A circuit group can use more than one demand pool. This enables the router to use one configuration for circuits across the router’s slots, because demand pools cannot use lines from different slots.

Each demand circuit group has its own ID. This number is distinct from the demand pool ID that identifies the line pool. Both individual demand circuits and demand circuit groups can use the same demand pool.

Using Demand Circuit Groups with Dial Backup Service

You can use demand circuit groups with dial backup service to dial an alternative site if the original destination cannot be reached. For information about using demand circuit groups and dial backup, see “Simplifying Unnumbered Configurations with Demand Circuit Groups” on page 7-4.

Managing Broadcast Traffic over Demand Circuits

Many of the routing protocols that you can select for a demand circuit send update packets out to the network. Update packets maintain routing tables and gather information about network resources. For dial-on-demand, the frequency of these update packets forces the dial-up connection to remain activated (unless you configure a time of day to deactivate it). When routers exchange update packets, the physical connection is established, unless you create a filter.

To reduce this type of traffic, you can configure one of the following:

- Static routes
- Dial-optimized routing
- RIP triggered updates and broadcast timers (for IP)
- RIP and SAP broadcast timers (for IPX)
- Traffic filters

Each method is described in the sections that follow.

Static Routes

You need to configure the demand circuit protocols so that they do not send broadcast messages to the network. After you disable broadcast messages, the router must determine the destination address using a static route.

A *static route* specifies the transmission path that data must follow to another network. This path is based on the destination address of the data. Protocols that can use static routes include:

- AURP
- DECnet
- DLSw

- IP
- IPX
- XNS

Demand circuits require static routes if you disable the circuit's routing update protocols. To configure a static route, you need to specify in the protocol's routing table the address of the network to which you will be sending data. The address must be unique to that circuit. For more information about static routes for each of these protocols, see the appropriate protocol guide.

Dial-Optimized Routing

Dial-optimized routing lets you exchange IP RIP and IPX RIP/SAP routing updates only when a connection is active. By limiting when the router sends updates, dial-optimized routing reduces the number of connections as well as line costs.

For each dial-on-demand circuit, you have the choice of enabling dial-optimized routing. If you enable dial-optimized routing, the router establishes a demand connection only for outbound data packets, or if it receives a request from the protocol. The presence of IP RIP and IPX RIP/SAP packets alone will not trigger a dial connection. If you disable dial-optimized routing, any packet can initiate demand connections.

To configure dial-optimized routing, see "Enabling Dial-Optimized Routing" on page 12-24.

Dial-optimized routing is supported for IP and IPX only. For all other protocols, the router activates a demand connection for any type of routing packet, regardless of whether you enable dial-optimized routing. To avoid this problem, you can configure traffic filters to prevent specific types of packets from activating a connection. See *Configuring Traffic Filters and Protocol Prioritization* for information about configuring filters.

What Happens When You Enable Dial-Optimized Routing

With dial-optimized routing enabled, the router activates a demand connection when there is data to send. The router then alerts IP and IPX that a connection is active and that they can broadcast routing updates. IP and IPX can also send triggered updates, if any occur while the connection is active.

The connection remains active for the time you specify in the Minimum Duration Time parameter. This timer specifies the minimum amount of time the connection is active. The timer must be set long enough to send complete routing updates to the remote routers. The inactivity time, which starts at the same time as the minimum duration timer, determines how long the connection remains active by monitoring data inactivity. When there is no more data transmitting, the inactivity time expires and the router deactivates the connection.

If you enable or disable dial-optimized routing dynamically while your demand connection is active, the router deactivates the connection. If there is still data to send after the call is cleared, the router places another call using the new configuration for the dial-optimized routing feature.

Exceptions for Sending Routing Updates

Routing updates are sent independent of data transmission when:

- An IP or IPX interface becomes active for the first time.

  When an IP or IPX interface first initializes, it sends routing updates to every node in the network. If there is no data to send, the connection expires in the time you specify in the Minimum Duration Time parameter.

- The RIP broadcast timer (IP) or RIP/SAP update interval (IPX) expires.

  Each time the broadcast timer or update interval expires, the protocol can request to send updates over an active connection. If you enable dial-optimized routing, the value of the timer defaults to a high value so that connections are infrequent. Reducing the value of the broadcast timer or update interval defeats the purpose of dial-optimized routing.

  If a connection is made because there is data to send, the router uses this opportunity to send routing updates. Consequently, these timers reset instead of expiring. This further reduces the frequency of connections made by a protocol request.

Maintaining the Routing Table

Although dial-optimized routing limits the amount of routing information sent across the network, you can maintain the accuracy of the routing tables using the following methods:

- Set the Hold Down Timer parameter to a higher value than the Broadcast Timer or Update Interval parameter.

  The Hold Down Timer parameter specifies how long unusable routes are advertised after the route is invalid. This ensures that unreachable routes remain in the routing table long enough to be broadcast over an active connection.

- Synchronize protocol requests for a connection.

  When a connection is active, the router sends status messages to IP or IPX, alerting the protocol that it can send routing updates. If IP or IPX does not receive this connection message, it makes a separate request for a connection. This request resets the Minimum Duration Time parameter and the connection then remains active for the specified time.

- Configure the router to handle oversubscription of lines.

  If you do not have enough lines to accommodate the number of circuits, you can enable an oversubscription timer. This timer determines how often the router retries a connection so that it can send routing updates if the previous attempt failed. The router keeps a list of circuits requesting connections and tries to establish these connections when the timer expires.

  To configure the oversubscription timer, you must use the Technician Interface; you cannot do this using Site Manager. The attribute entry is wfSwservOptsEntry.wfSwservOptsOverSubRetryTimer. The default value is 2 minutes; the maximum value is 1440 minutes.

See *Configuring IP, ARP, RARP, RIP, and OSPF Services* for information about RIP and *Configuring IPX Services* for information about RIP/SAP.

IP RIP Triggered Updates and Broadcast Timers

To prevent broadcast messages from keeping the demand circuit active, you can configure the RIP broadcast timer and triggered updates.

The broadcast timer lets you configure how often the router sends routing updates to the network. Unlike the broadcast timer, triggered updates are sent immediately after the router detects a routing change in the network.

If you set the broadcast timer to a high value, for example, several hours, and you enable triggered updates, you limit the frequency of broadcast traffic while maintaining the accuracy of the routing tables. By limiting broadcast traffic, you prevent the demand circuit from remaining active unnecessarily.

For more information about these RIP features, see *Configuring IP, ARP, RARP, RIP, and OSPF Services.*

IPX RIP and SAP Broadcast Timers

To prevent broadcast messages from keeping the demand circuit active, you can configure RIP and SAP broadcast timers for IPX transmission. RIP and SAP broadcast timers enable you to control how often update transmissions occur. You can even eliminate RIP and SAP broadcasts entirely. By controlling broadcast traffic, you can prevent the demand circuit from remaining active unnecessarily.

For more information about broadcast timers, see *Configuring IPX Services*.

Traffic Filters

To prevent routing updates and protocol-specific messages from keeping the circuit active, you can configure traffic filters that specify which packets are permitted across an established dial-up line and which packets are prevented from activating a dial-up line. Traffic filters enable the router to selectively relay or drop a packet, frame, or datagram, based on standard protocol fields or user-defined fields.

If you implement inbound filters, the router drops unwanted packets at the interface where it receives data. By filtering incoming data, you can prevent unwanted packets from going to the destination interface.

If you implement outbound filters, the router drops unwanted packets before dialing a line. The router continues to filter the data so that unwanted packets do not keep the circuit active.

You can also filter outbound packets to prevent the inactivity time from resetting. For example, RIP packets can always be sent, but if no other data is sent, the inactivity time expires and the line is deactivated.

To set up traffic filters, see *Configuring Traffic Filters and Protocol Prioritization.*

Data Compression

You can configure one of two compression protocols over any PPP demand circuit:

- Nortel Networks proprietary data compression protocol, WCP
- Hi/fn LZS

Enabling compression improves bandwidth efficiency by eliminating redundant strings in data streams. This, in turn, improves network response times and yields line-cost savings.

To implement data compression, you select either WCP or Hi/fn LZS as one of the protocols for the demand circuit. To configure protocols for the demand circuit, see “Adding Layer 3 Protocols to PPP Demand Circuits” on page 12-36. Note that WCP does not work with any other vendor’s compression protocol.

For more information about data compression, see *Configuring Data Compression Services.*

PPP Multilink

Multilink is a feature of PPP that you can enable for individual PPP links. Links are logical communication channels between two routers. A typical link includes one ISDN B channel, one dial-up modem connection, and a leased T1 line.

Multilink is important for demand circuits that use bandwidth-on-demand service because it enables you to:

- Group lines of different speeds.
- Distribute traffic more evenly among the lines.
- Restore packet sequence.
- Monitor traffic volume (for bandwidth-on-demand service).

These features enable the router to add bandwidth to relieve a congested demand circuit.

When you enable multilink, you can combine a set of lines between two routers into a single *bundle*. Each bundle belongs to a separate circuit. Multilink distributes traffic over each logical line in a bundle in an amount proportional to the bandwidth of the link. When data reaches the destination router, multilink resequences packets arriving on different lines.

For ISDN lines, you can manage the allocation of bandwidth in a multilink bundle by enabling the PPP Bandwidth Allocation Protocol (BAP). For more information about this protocol, see Chapter 8, “Bandwidth-on-Demand Implementation Notes.”

For more information about PPP multilink, see *Configuring PPP Services.*

Protocol Prioritization

When you configure a router, you can prioritize the different types of traffic sent across a synchronous line. This process is called *protocol prioritization*. Prioritizing traffic is important for your time-sensitive applications.

For example, a user at router A participating in a Telnet session with router B requires a more immediate response than a user at router A performing a file transfer with router B.

When you configure a demand circuit, the router automatically enables protocol prioritization because PPP requires priority for control messages.

Although protocol prioritization is set automatically, you still need to configure priorities and filters. For more information about protocol prioritization, see *Configuring Traffic Filters and Protocol Prioritization*.

Chapter 7
Dial Backup Implementation Notes

This chapter describes the Nortel Networks implementation of dial backup service. Most of these notes apply only to circuit backup; that is, they apply only to a primary Nortel Networks Standard, PPP, or frame relay PVC. Data compression is the only feature that you can use with circuit and link backup.

This chapter contains the following information:

Topic	Page
Bay Command Console	7-1
Data Compression	7-2
Defining the Role of the Router in the Network	7-2
Bandwidth for Backup Circuits	7-2
Using Unnumbered Interfaces to Dial an Alternative Site	7-3

Bay Command Console

You can configure dial backup service using the Bay Command Console (BCC). The BCC is a command-line interface for configuring Nortel Networks devices. In BCC configuration mode, you can create a customized configuration and modify this configuration.

In configuration mode, you navigate through the configuration tree hierarchy to objects that enable you to create dial backup service. To navigate through the configuration hierarchy and learn what you can configure at each level, enter a question mark (**?**) or the **help tree** command at any prompt.

To learn more about the BCC, see *Using the Bay Command Console (BCC).*

Data Compression

You can configure one of two compression protocols over any PPP backup circuit:

- Nortel Networks proprietary data compression protocol, WCP
- Hi/fn LZS

Enabling compression improves bandwidth efficiency by eliminating redundant strings in data streams. This, in turn, improves network response times and yields line-cost savings.

To implement data compression, you select either WCP or Hi/fn LZS as one of the protocols for the backup circuit. Note that WCP does not work with any other vendor's compression protocol.

For more information about data compression, see *Configuring Data Compression Services*.

Defining the Role of the Router in the Network

When you configure a router for dial backup, you must specify whether the router initiates calls or waits to receive calls. The router placing the backup call waits until the primary circuit fails. The other router then waits for the call without trying to initiate one. If you do not specify the role of each router, they try to call one another simultaneously and each router receives a busy signal.

You define the role of a router by defining the backup mode of the circuit. Do not specify the same value for both sides of the circuit.

To modify the backup mode, see "Modifying Which Router Initiates a Call" on page 13-10.

Bandwidth for Backup Circuits

Time-sensitive protocols or interactive protocols (for example, Telnet) may not function correctly over a backup circuit that has less bandwidth than the primary circuit. When user-response time is critical, backup circuits require the same bandwidth as the primary circuits.

Using Unnumbered Interfaces to Dial an Alternative Site

IP unnumbered interfaces define a point-to-point connection for which you do not configure a specific IP address, for example, 128.185.35.70. Instead, you configure an address of 0.0.0.0. Unnumbered interfaces are useful because the router is no longer restricted to a specific IP destination address. This gives the router the flexibility to dial another site if it cannot reach the original destination.

If you configure unnumbered IP over a PPP primary circuit, and the connection to the destination router fails, the local router automatically dials each phone number in the outgoing phone list until it successfully connects to another router.

You can also configure unnumbered interfaces for IPX and bridging; however, the sample network that follows describes only IP. For more information about unnumbered interfaces, see *Configuring IP, ARP, RARP, RIP, and OSPF Services*, *Configuring IPX Services*, or *Configuring Bridging Services*.

Sample Network Using Unnumbered Interfaces

Figure 7-1 shows a sample network using unnumbered IP interfaces and dial backup service. Router A, the remote router, connects to router B, the regional router, via a primary leased line. Router B connects to router C, the central router, via a regular leased line, that is, a leased line without dial backup service.

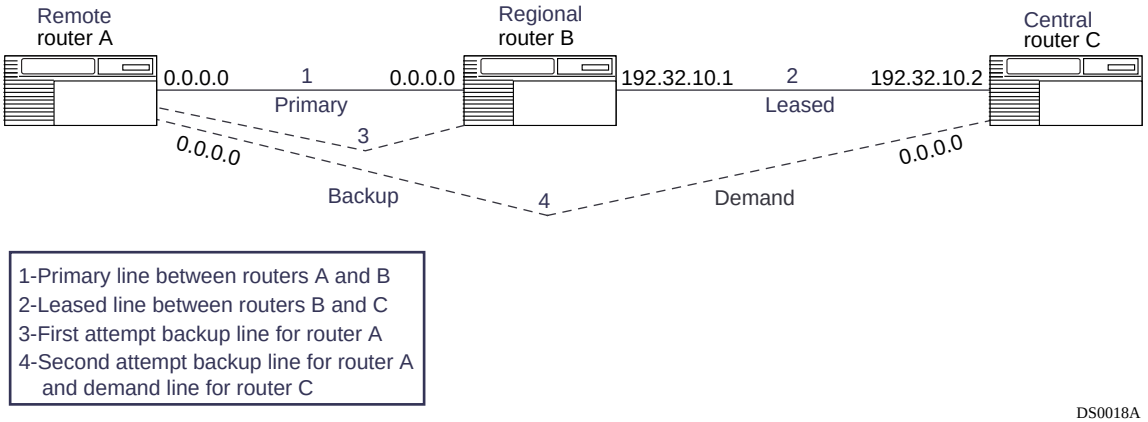


Figure 7-1. Dialing an Alternative Router Using Unnumbered IP Interfaces

If the primary connection between routers A and B goes down, the backup circuit takes over, adopting the configuration of the primary circuit. The backup circuit tries to call router B, but it cannot establish a connection.

Because you configured unnumbered IP addresses on the primary circuit, router A is not limited to calling router B. Router A dials the next phone number in its outgoing phone list, router C's phone number, and makes a connection.

For router A to dial router C, configure the routers as shown in Table 7-1.

Table 7-1. Configuration Requirements for Routers A and C

Router A	Router C
Configure an unnumbered PPP primary circuit.	Configure a demand pool with unnumbered demand circuits.
Configure routing protocols for the primary circuit.	Configure routing protocols on the demand circuit to match router A's routing protocol configuration for the primary circuit.
N/A	Set the Connection Mode parameter to No Dial.
Configure CHAP Local Name/CHAP Secret or PAP Local ID/PAP Password for the primary circuit.	Configure the caller resolution table to include router A's CHAP Name/CHAP Secret or PAP ID/PAP Password

Simplifying Unnumbered Configurations with Demand Circuit Groups

You can simplify configurations for large networks by using a demand circuit group and dial backup service.

A demand circuit group is a set of demand circuits that share the same user-defined unnumbered protocol configuration. An unnumbered protocol configuration does not restrict the router to a specific destination address. Instead, it enables the router to use any circuit in the group for an incoming call, eliminating the need to configure a unique demand circuit for each remote router in the network. One demand circuit group supports many remote routers, thereby reducing the configuration tasks for a large network.

See Chapter 6 for a detailed description of demand circuit groups.

Sample Network Using Demand Circuit Groups

Figure 7-2 shows a sample network using demand circuit groups. Router 1 is a regional router that supports hundreds of remote routers. Router 5 serves as a recovery router for several branch offices if router 1 fails.

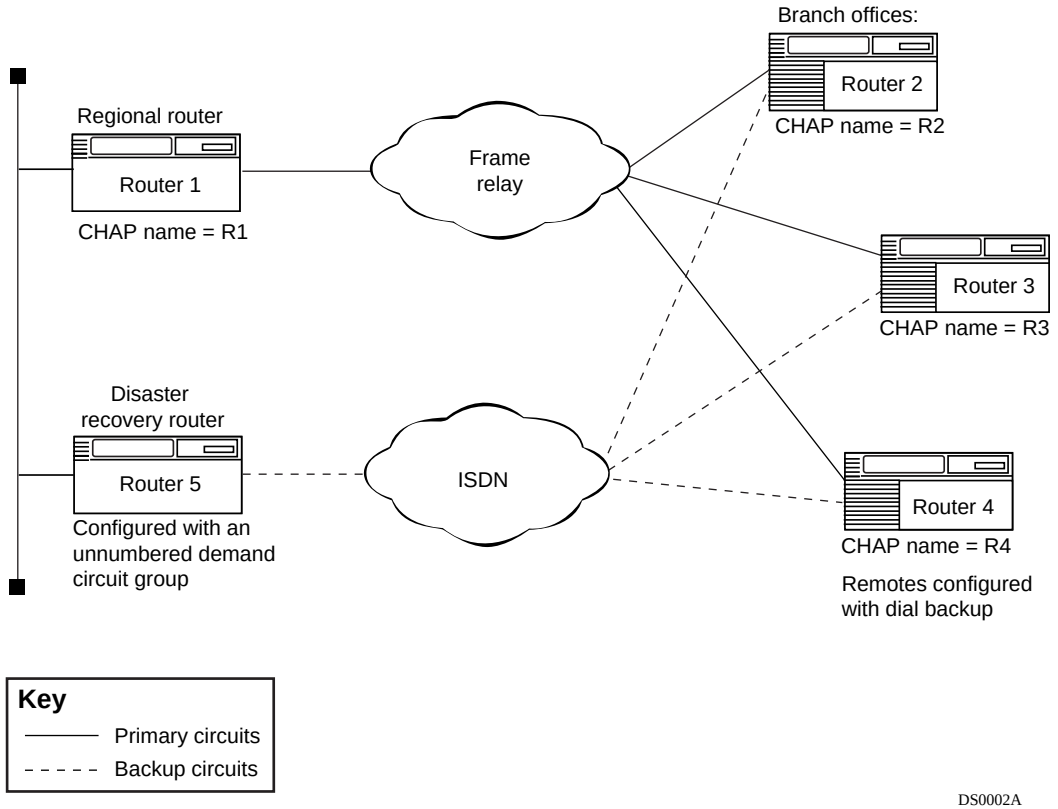


Figure 7-2. Dialing an Alternative Router Using Demand Circuit Groups

This type of network is ideal for a demand circuit group because it supports many nodes. If you were to configure each circuit individually, the task of backing up each remote router would be difficult. By using demand circuit groups, however, you need only one configuration on the disaster recovery router to support many remote sites.

The configuration for this type of network is as follows:

- The branch offices are configured for dial backup and are connected directly to the regional router. They determine whether the connection to the regional router fails and, if so, invoke the dial backup connection.
- The circuits on router 5, the recovery router, are configured as a demand circuit group, consisting of three circuits. (Router 5 uses an existing demand pool for the demand circuit group.) These circuits accept calls from the remote routers configured for dial backup.

  The Connection Mode parameter for the circuits in the demand circuit group is set to No Dial because the recovery router does not initiate connections. The remote router must establish the connection first.
- Router 5's caller resolution table contains entries for routers 2, 3, and 4. Each entry specifies the same demand circuit group.

In the example, if one of the branch offices detects a failure of the regional router's primary line, it attempts to activate a dial backup connection by placing a call to the recovery router. The number of branch offices that successfully connect to the recovery router depends on the number of circuits in the demand circuit group. After the connection is made, data can continue across the network.

Note: Demand circuit groups work only with PPP. You cannot use them in a network where the dial backup circuits use frame relay.

Chapter 8
Bandwidth-on-Demand Implementation Notes

This chapter includes the following information about the Nortel Networks implementation of bandwidth-on-demand service:

Topic	Page
Bandwidth-on-Demand Terminology	8-2
PPP Multilink	8-2
PPP Bandwidth Allocation Protocol	8-4
Data Compression	8-7
Protocol Prioritization	8-8
Defining the Role of the Router in the Network	8-8
Balancing Traffic Between Lines in a Multilink Bundle	8-8
External Clock Speed Effects on Congestion Thresholds	8-9
Testing the Bandwidth-on-Demand Connection	8-9

Bandwidth-on-Demand Terminology

Table 8-1 lists the terminology that Site Manager and this guide use to describe circuits in a bandwidth-on-demand configuration.

Table 8-1. Terminology for Bandwidth-on-Demand Service

Type of Circuit	Referred to As
Leased circuit Leased multilink circuit	Bandwidth circuit You designate a leased circuit as a bandwidth circuit to enable bandwidth-on-demand service.
Dial-on-demand circuit	Demand circuit This is a demand circuit for which you can provide bandwidth-on-demand service. You do not designate this as a bandwidth circuit.
Dial-up circuit that helps the congested leased circuit	Dial-up or secondary circuit

PPP Multilink

Multilink is a feature of PPP that you can enable for individual PPP links. Site Manager automatically configures PPP multilink when you configure circuits for bandwidth-on-demand service.

Links are logical communication channels between two routers. A typical link includes two ISDN B channels, one dial-up modem connection, and a leased 64 Kb/s line. Multilink enables you to:

- Group lines of different speeds.
- Distribute traffic more evenly among the lines.
- Maintain packet sequence.
- Monitor traffic volume (for bandwidth-on-demand service).

These features are particularly beneficial for bandwidth-on-demand configurations, where the router activates additional dial-up lines to relieve congestion over a single leased line, a leased multilink bundle, or a demand line.

Multilink lets you combine a set of lines between two routers into a single *bundle*, which can consist of up to 30 links of different speeds. The actual number of links in the bundle depends on the hardware platform, total bundle speed, the speed of each link in the bundle, and the type of traffic.

Each bundle belongs to a separate circuit. Multilink distributes traffic over each logical line in a bundle in an amount proportional to the bandwidth of the link.

The router sending the data divides the outbound traffic among all the lines in the bundle. When data reaches the destination router, multilink reassembles and resequences packets arriving on different lines.

Figure 8-1 shows how multilink and bandwidth-on-demand work together. In this figure, one router is the congestion monitor. This router monitors traffic volume over the bandwidth circuit. If the monitor router detects congestion, it activates an additional line, in this case, an ISDN B channel. If the volume of traffic is still heavy, the monitor router adds more channels until congestion is relieved.

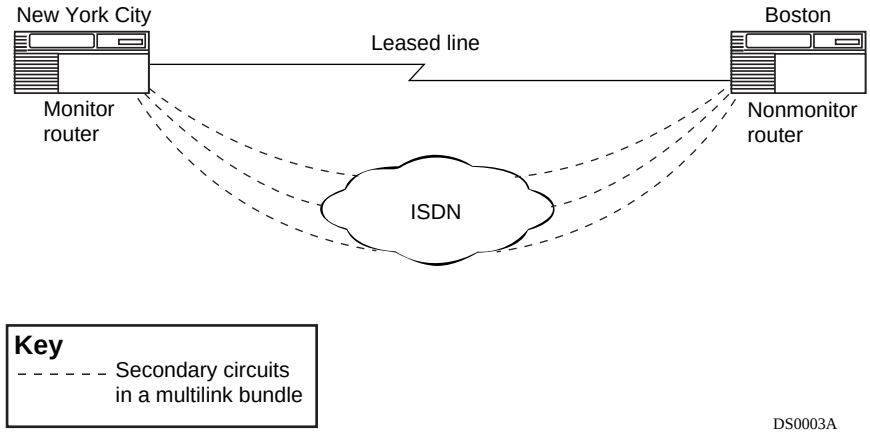


Figure 8-1. Multilink and Bandwidth-on-Demand Operation

For more information about PPP multilink, see *Configuring PPP Services.*

Multilink Fragmentation

Multilink fragmentation splits datagrams into smaller packets when necessary and sends these packets across links in a multilink bundle. Fragmentation improves the distribution of data across multilink lines and uses buffer resources more efficiently, thereby improving communication over bandwidth circuits. Nortel Networks routers comply with RFC 1717, which defines PPP multilink.

Packets sent across links in a multilink bundle have an outer header packet that contains a unique packet sequence number and allows for the following:

- Fragmentation of the original packets
- Assignment of sequence numbers to each fragment
- Transmission across links in a multilink bundle
- Reassembly of the original sequence and packet size at the destination router

For more information about multilink and fragmentation, see *Configuring PPP Services*.

PPP Bandwidth Allocation Protocol

The PPP Bandwidth Allocation Protocol (BAP), defined in RFC 2125, manages the dynamic allocation of bandwidth across links in a multilink bundle. It provides a flexible yet powerful method of managing bandwidth between two routers.

BAP is only available for bandwidth-on-demand service across ISDN lines.

BAP does the following:

- Coordinates the addition and removal of links from a bundle
- Enables a router to pass information to its peer, so the peer knows which phone number to dial to activate a connection
- Defines call control packets that enable the router to add or remove bandwidth effectively

BAP has the following advantages:

- Ensures effective use of bandwidth.
- Allows Nortel Networks routers to work together or with other vendors' routers.

- Minimizes the configuration of outgoing phone numbers because only one number is required. The peer passes other phone numbers to the router, which the router then uses to make calls.
- Uses call requests to determine whether bandwidth is available, which saves the cost of placing a call to find out this information.

  Call requests are BAP protocol messages and are unrelated to ISDN call requests. When the router sends a BAP call request, it uses active lines, so there is no call attempt and no phone charge.
- Ensures that both routers agree to activate and deactivate the lines, so there are no allocation conflicts.

The Bandwidth Allocation Control Protocol (BACP) is the control protocol. It negotiates the use of BAP, enabling BAP data to be exchanged between the peer routers. If BACP negotiation fails, the router will not use BAP for bandwidth-on-demand service.

How BAP Works

Figure 8-2 shows BAP negotiation between two routers.

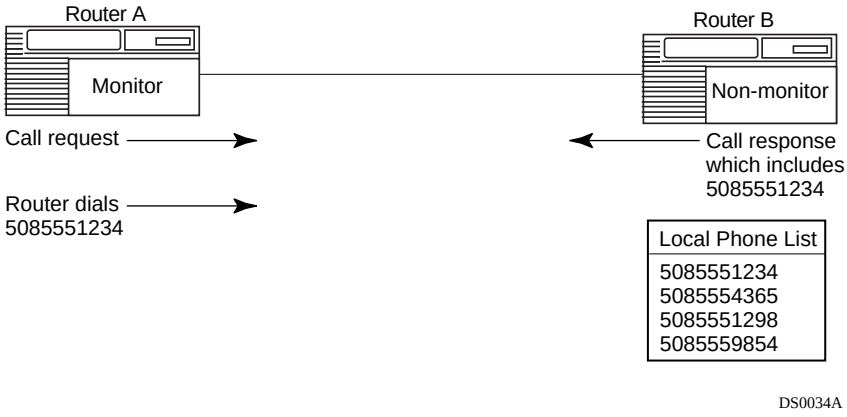


Figure 8-2. BAP Negotiation Between Two Routers

In this example, two Nortel Networks routers are connected. Router A has only one phone number in its outgoing phone list for the destination, router B. Router A calls router B. While they are communicating, router A, the monitor router, determines that it needs more bandwidth based on the user-defined congestion thresholds. BAP negotiation then begins as follows:

1. Router A sends a call request asking for more bandwidth.
2. Router B, the non-monitor router, checks the router slots to find an available line. It uses the Preferred and Reserved Bandwidth Slot parameters to determine which slots to check first. You can set these parameters for a non-monitor router if the Bandwidth Mode parameter is set to Dynamic Monitor.
3. When it finds an available line, router B sends a call response that includes the local phone number of the available line.
4. Router A calls the new phone number. Router B then activates the additional line.
5. If the lines become congested again, router A repeats the process.

If router B uses all the available phone numbers, and router A sends another call request for bandwidth, router B can inform router A that there are no available lines, saving router A the cost of calling to make a connection.

When router A no longer needs the extra bandwidth, it must ask router B to deactivate the line. Both routers must agree to deactivate the line to prevent one router from keeping the line active while the other tries to deactivate it.

BAP Negotiation with Non-Nortel Networks Routers

If your Nortel Networks router communicates with another vendor's router, both routers may be monitoring congestion, regardless of who initiated the call. Bandwidth allocation algorithms or congestion thresholds may not always be the same on both sides of the line. Therefore, both routers must agree to activate or deactivate the line to prevent one side from keeping the line active while the other tries to deactivate it.

Configuring BAP

To use BAP, you must configure bandwidth-on-demand service for single leased lines, leased multilink bundles, or dial-on-demand circuits. After you set up bandwidth-on-demand service, you can configure BAP. For configuration instructions, see “Enabling BAP for Bandwidth-on-Demand Service” on page 14-8.

You also need to set up a local phone list if your router is responsible for passing phone numbers to its peer router to activate additional lines. To set up a local phone list, see “Creating a Local Phone List (ISDN Only)” on page 15-23.

If you do not configure BAP for your bandwidth connections, the monitor router adds bandwidth without negotiating with the non-monitor router.

Data Compression

You can configure one of two compression protocols over any PPP bandwidth-on-demand circuit:

- Nortel Networks proprietary data compression protocol, WCP
- Hi/fn LZS

Enabling compression improves bandwidth efficiency by eliminating redundant strings in data streams. This, in turn, improves network response times and yields line-cost savings.

To implement data compression, you select either WCP or Hi/fn LZS as one of the protocols for the bandwidth circuit. Note that WCP does not work with any other vendor’s compression protocol.

For more information about data compression, see *Configuring Data Compression Services*.

Protocol Prioritization

When you configure a router, you can prioritize the different types of traffic sent across a line. This process is called *protocol prioritization.* When you configure leased bandwidth circuits, the router automatically enables protocol prioritization. Prioritizing traffic is important for your time-sensitive applications.

For example, a user at router A participating in a Telnet session with router B requires a more immediate response than a user at router A performing a file transfer with router B.

Although protocol prioritization is set automatically, you still need to configure priorities and filters. For more information about protocol prioritization, see *Configuring Traffic Filters and Protocol Prioritization*.

Defining the Role of the Router in the Network

Leased bandwidth circuits are point-to-point connections. For each circuit, you must designate a router at one end of the connection as the *congestion monitor.*

The congestion monitor checks the congestion of the lines in a multilink bundle. If this router discovers congestion, it activates secondary lines. The router at the other end of the connection, the *non-monitor router,* does not have the authority to activate a secondary line. Do not set the Bandwidth Mode parameter to the same value for both routers. This will prevent the routers from activating a second line simultaneously.

You define the role of the router using the Bandwidth Mode parameter, which is part of the bandwidth circuit configuration (see “Customizing Bandwidth-on-Demand Service” on page 14-2).

Balancing Traffic Between Lines in a Multilink Bundle

With multilink enabled for bandwidth-on-demand service, the router divides the outbound data traffic among all links in the bundle. The external clock speed of each line determines how much of the total traffic each link receives. On the receiving end, multilink resequences packets arriving on different links using the sequence number from the multilink header.

For more information about traffic distribution, see *Configuring PPP Services.*

External Clock Speed Effects on Congestion Thresholds

The router uses several congestion threshold parameters to measure congestion on the bandwidth circuit. The values of these parameters determine when the router activates additional lines to relieve congestion.

If you want to change the clock speed of your leased line to a value other than the default, 64 Kb/s, this affects how the router calculates the congestion thresholds. To ensure that the router's calculations are accurate, you must modify the clock speed using the synchronous line parameter External Clock Speed. When you configure this parameter to match the line speed, you ensure that the congestion thresholds will be correct.

The External Clock Speed parameter is part of the synchronous line configuration. To access synchronous line parameters, begin at the Configuration Manager window and choose Circuits > Edit Lines. From here, you can select the circuit that you want to edit.

For instructions on accessing and modifying the synchronous line parameters, see *Configuring WAN Line Services.*

Testing the Bandwidth-on-Demand Connection

To ensure that the router can activate a secondary line if a leased line becomes congested, you can use the Technician Interface to execute the **forced dial** command. The **forced dial** command tells the router that the leased line or bundle is congested, even if it is not. This forces the router to activate a secondary line. If the router cannot activate a secondary line, there is a problem with the line.

To issue the **forced dial** command, set the value of the forced dial attribute to 1. The command syntax is as follows:

set wfSwservOptsEntry.wfSwservOptsForcedDial.<*circuit_no.*> **1;commit**

To deactivate a forced dial connection, issue a **forced take down** command. The command syntax is as follows:

set wfSwservOptsEntry.wfSwservOptsForcedTakedown.<*circuit_no.***> 1;commit**

You cannot use this test for demand circuits using bandwidth-on-demand service.

Chapter 9
Customizing Line Pools

This chapter provides instructions on how to modify dial-on-demand, dial backup, and bandwidth-on-demand line pools. You should have already created line pools according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager,” or Chapter 3, “Starting Dial Services Using the BCC.” To create additional line pools, see those chapters.

You can use Site Manager to modify all three dial services; you can use the BCC to modify dial-on-demand and dial backup configurations.

This chapter include the following topics:

Topic	Page
Changing Pool IDs	9-2
Deleting Pools	9-2
Modifying PPP Dial Interfaces in a Pool	9-4

Remember these guidelines about line pools:

- When adding lines to a pool, configure all lines in the pool to use the same authentication protocol. You cannot have a pool with one line using CHAP and another using PAP.
- Both individual circuits and demand circuit groups can use demand pools.
- If you plan to configure RADIUS for any dial service, all lines in a line pool must use RADIUS.

Changing Pool IDs

Using Site Manager, you can change the pool ID of an existing line pool.

Before you can change a pool ID, you must first delete all circuits associated with that pool. For instructions on deleting circuits, see the appropriate chapter for customizing circuits.

To change a pool ID:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select a pool entry at the top of the window.	The Pool ID for the selected entry appears in the Pool ID field.
4. Set the **Demand/Backup/Bandwidth Pool ID** parameter. Click on **Help** or see the parameter description on page A-4.	
5. Click on **Done**.	You return to the Configuration Manager window.

Deleting Pools

You can use Site Manager to delete any type of line pool. You can use the BCC to delete demand and backup pools. Before you can delete a pool, you must first delete all circuits associated with that pool. Deleting a demand pool removes all the lines in the pool.

For instructions on how to delete circuits, see the appropriate chapter for customizing circuits.

Using the BCC

You can delete a line pool in one of two ways:

- Navigate to the demand or backup pool prompt and enter:

  delete

  For example:

  ```
  demand-pool/2# delete
  backup-pool/4# delete
  ```

- Go to the box, stack, or modem prompt and enter:

  delete *<object_instance_ID>*

  For example:

  ```
  box# delete demand-pool/2
  ```

Using Site Manager

To delete a line pool:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select a pool entry at the top of the window.	The Pool ID for the selected entry appears in the Pool ID field.
4. Click on **Delete**.	Site Manager asks if you are sure you want to delete the pool.
5. Click on **OK**.	You return to the Demand, Backup, or Bandwidth-on-Demand Pools window.
6. Click on **Done**.	You return to the Configuration Manager window.

Modifying PPP Dial Interfaces in a Pool

Using the BCC, you can modify several PPP parameters to customize how PPP lines operate as dial interfaces. You can modify these parameters for both modem and ISDN lines. The next sections describe how to set these parameters.

To set the equivalent Site Manager parameters, see *Configuring PPP Services.*

Setting a Time Limit for Convergence

Convergence occurs when the peers have negotiated all the parameters needed to establish a dial connection. You can limit the amount of time that PPP attempts to negotiate a dial PPP interface by setting the **convergence-timer** parameter.

The convergence timer specifies the maximum number of seconds allowed for the completed negotiations. It limits the LCP negotiations and requires at least one NCP to negotiate within the configured amount of time. The default value is 300 seconds. If the timer expires before the negotiation completes, the connection is cleared.

The convergence timer allots the configured number of seconds for the Link Control Protocol (LCP) to negotiate and allots the same period for one Network Control Protocol (NCP) to complete negotiations.

To set the convergence timer, navigate to the dial prompt and enter:

convergence-timer *<integer>*

integer is a value from 1 to 5000 seconds.

For example:

```
dial/bri/1/1# convergence-timer 350
```

Specifying the Asynchronous Modem Control Character Map

If you are using asynchronous PPP and asychronous modems, you may want to set up asynchronous modem control characters. During LCP negotiations, the peers negotiate the characters that they will recognize as asynchronous modem control characters. PPP creates a 32-bit map that represents the negotiated control characters. Both routers use this map in sending and receiving data packets. Although the default value serves for almost all modems, you can configure the map for other modem control characters if necessary.

The async control character map specifies a value representing one or more asynchronous modem control characters for the peer to recognize ("escape") and that may occur in the data packet. Each bit in the map corresponds to one control character, 0x00 (the right end of the map) through 0x1f (the left end of the map); that is, 0 through 31, decimal. The actual map is a value used essentially as a mask. For example, the default map value, 0xa0000 (655360 decimal) allows the escaping of the control characters 0x11 (XON) and 0x13 (XOFF) if they occur in the data stream. The values 0x7d and 0x7e are always escaped.

If you have a modem that requires control characters different from the default, you can build your own async control character map. Determine the corresponding bit for each character by converting the hexadecimal value of the control character to decimal. For example, 0x1f = 31 decimal; to escape that character, set the leftmost bit in the map. Do the same thing for each control character. After you decide what bits in the map to set, you can enter either the hex character equivalent to the bit string or the decimal equivalent. To escape all control characters in the packet, set the map to 0xffffffff. For a description of how PPP encodes escaped control characters in the data stream, see *Configuring PPP Services*.

PPP displays the decimal number equivalent to the string and uses that value in its link negotiations.

To set the async control character map, navigate to the dial prompt and enter:

accm-seed *<integer>*

integer is a number from 0 to 4,294,967,295 (0x00 through 0xFFFFFFFF).

For example:

```
dial/bri/1/1# accm-seed 755300
```

Setting the Maximum Receive Unit (MRU)

The **mru** parameter specifies maximum receive unit (MRU) size, in bytes, for the line. This parameter works with the **mru-compliance** parameter to ensure the correct MRU size. The **mru** parameter default value for PPP dial lines is 1500 bytes. To ensure this value, the **mru-compliance** parameter is enabled by default. (For leased lines, the default is 1590.)

In most cases, you can accept the default value of 1500 bytes. However, if you want to change the default MRU size, navigate to the dial prompt and enter:

mru *<integer>*

integer is a value from 1 to 4600 bytes.

For example:

```
dial/serial/3/1# mru 1590
```

If you configure an MRU size other than the default, be aware that the router can negotiate only for an MRU value that is larger than its configured value. The range that it can negotiate is between the configured MTU size and the router's driver MTU value minus the PPP header and CRC size. For example, if the configured MTU is 1500 and the driver MTU is 1600, the negotiation range is 1500 to 1590 (1600 - 8 - 2 = 1590).

Note: Dial-up lines add 56 bytes to the frame's header and, if you enable the WAN Compression Protocol (WCP), that adds an additional 5 bytes. Instead of fragmenting large packets to stay within the size of the default MTU, both Site Manager and the BCC automatically increase the size of the MTU. Therefore, you do not need to adjust the driver MTU to accommodate the additional frame headers. Site Manager and the BCC automatically update dial-up lines only; they do not update leased lines.

We recommend that the peer be configured for an MRU value of at least 1500 bytes. Note also that the router and its peer do not have to use the same MRU value to communicate with one another.

For leased lines, the router negotiates the MRU size automatically, but you must disable the **mru-compliance** parameter. For instructions, go to the next section "Disabling MRU Compliance."

Disabling MRU Compliance

The **mru-compliance** parameter enables the router's MRU size to comply with RFC 1661, the document that defines PPP standards. For dial lines, **mru-compliance** is enabled by default, so you can use the standard MRU size, 1500 bytes, or manually configure a different size.

For leased lines, the router negotiates the MRU size automatically. To allow the negotiation process, you must disable the **mru-compliance** parameter.

To disable **mru-compliance**, navigate to the dial prompt and enter:

mru-compliance disabled

For example:

`dial/pri/2/1#` **mru-compliance disabled**

Chapter 10
Customizing Modem Lines

This chapter provides instructions on how to modify dial modem lines. You should have already created line pools according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager,” or Chapter 3, “Starting Dial Services Using the BCC.”

You can use Site Manager to configure all three dial services; you can use the BCC to modify modem lines for dial-on-demand and dial backup configurations.

This chapter includes the following information:

Topic	Page
Modifying the WAN Interface Type	10-2
Modifying the Line Media Type and Cable Type	10-3
Modifying the Line Priority	10-5
Modifying External Modem Configurations	10-7
Modifying the ARN Internal Modem Configuration	10-13
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Modifying the WAN Interface Type

You can determine whether this interface uses synchronous or asynchronous communication by defining the serial interface type. The default is synchronous. To use asynchronous PPP connections, you must change the WAN interface type to asynchronous.

You can configure asynchronous interfaces on the AN, ASN, and ANH (using the Dual Sync Net Module); ARN (using any serial expansion module); and BLN and BCN (using the Octal Sync Link Module). For more information, see Chapter 5, "Implementation Notes for All Dial Services."

You already set the WAN interface type in Chapter 2, "Starting Dial Services Using Site Manager" or Chapter 3, "Starting Dial Services Using the BCC." To modify it, go to one of the following two sections.

Using the BCC

The **wan-type** parameter sets the serial interface type. To set this parameter, navigate to the serial interface prompt and enter:

wan-type *<type>*

type can be:

synchronous - This is the default. Choose this option for synchronous connections.

asynchronous - Choose this option if you are using asynchronous PPP across the backup lines. Otherwise, accept the default, synchronous.

polled-asynchronous - Not applicable for dial services.

For example, to change the default wan-type and create an asynchronous interface on slot 5, connector 2, enter:

```
serial 5/2# wan-type asynchronous
```

Using Site Manager

To modify the WAN serial interface type:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose interface you want to change. The connector name should include a D, B, or W.	The Edit Connector window opens.
2. Click on **Edit Line**.	The Edit SYNC Parameters window opens.
3. Set the **WAN Serial Interface Type**. Click on **Help** or see the parameter description on page A-5.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Line Media Type and Cable Type

You can define the media type and cable type for serial interfaces only. The media type specifies the signaling method that the router uses to interact with the modem. The cable type indicates the physical interface type supported by the attached dial device.

You already set the media type in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC.”

You can modify the media type and cable type using the BCC or Site Manager, as described in the following sections.

Using the BCC

To modify the media type, navigate to the serial prompt and enter:

media-type *<type>*

type can be:

raise-dtr - A signaling method that enables access to the network by preprogramming the destination phone numbers into the dial device. Raise DTR signaling works with any of these interfaces: X.21, V.35, RS-232, and RS-422.

v25bis - A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Using V.25bis, the dial device can use multiple phone numbers to call multiple destinations. V.25bis signaling works with any of these interfaces: X.21, V.35, RS-232, and RS-422.

hayes - A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Hayes signaling is for asynchronous PPP and works with RS-422 and V.34 interfaces. To use Hayes as the serial media type, you must also specify a modem initialization string. The router sends this string to the modem to initiate a call.

For example:

```
serial/3/3# media-type v25bis
```

To set the cable type, navigate to the dial interface prompt and enter:

cable-type *<value>*

value can be: null, rs232, s422, v35, or x21.

Select the option that corresponds to the interface type supported by the attached dial device.

For example:

```
dial/serial/3/3# cable-type rs232
```

Using Site Manager

To modify the line media type and cable type:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose interface you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Line**.	The Edit SYNC Parameters window opens.
3. Set the following parameters: • **Line Media Type** • **Cable Type** Click on **Help** or see the parameter descriptions beginning on page A-5.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Line Priority

For serial interfaces, you can prioritize lines in a pool, instructing the router which line to use first, second, and so on when a dial line is required. The lower the number you assign to an interface, the higher its priority.

For dial backup and bandwidth-on-demand pools, lines can reside across slots, but when you set the line priority, it affects only lines on the same slot. For example, if the backup pool has two lines on slot 3 and two lines on slot 4, the router sets a priority between the lines in slot 3, then between the lines in slot 4. For bandwidth-on-demand, the router prioritizes lines in the preferred slot, then the reserved slot, and finally, the local slot.

You can modify the line priority using the BCC or Site Manager, as described in the following sections.

Using the BCC

To prioritize lines in a pool, navigate to the dial interface prompt and enter:

line-priority *<integer>*

integer is a number from 1 to 50.

For example:

`dial/serial/3/3#` **line-priority 1**

This command tells the router to use the line for slot 3 connector 3 first as a backup line.

Using Site Manager

For pools that combine modem and ISDN lines, coordinate the priority assignments for this interface with those that you set using the Pool Channel Priority parameter for the ISDN interface.

To set the priority for modem lines:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose interface you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Line**.	The Edit SYNC Parameters window opens.
3. Set the **Priority** parameter. Click on **Help** or see the parameter description on page A-8.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying External Modem Configurations

If your dial application uses external modems, you can modify the commands that the router sends to the modem. The parameters that you can modify apply to each type of modem signaling (Raise DTR, V.25bis, or Hayes).

If you are using an ARN V.34 Adapter Modem module, see "Modifying the ARN Internal Modem Configuration" on page 10-13.

Using Modem Factory Defaults

You can specify whether exclusive use of the factory default modem initialization string is enabled or disabled. When the factory default string is enabled, the router sends only the default string (ATT&d0&k3&X0S0=2S2=43) to the modem. When it is disabled, the router sends a user-specified initialization string after sending the default string. This user-specified string is set in the Modem Config String parameter using Site Manager and in the init-string parameter using the BCC. Commands in the user-specified string take precedence over the factory default command string.

Using the BCC

To enable or disable the factory default settings for the modem configuration, navigate to the serial interface prompt and enter:

factory-defaults-load *<state>*

state is enabled or disabled.

For example:

```
serial/2/1# factory-defaults-load enabled
```

You must set the factory-defaults-load parameter to **disabled** when configuring a Hayes compatible external modem for asynchronous interfaces.

Specifying a Modem Initialization Command (Hayes Only)

For Hayes compatible modems, you can specify a custom initialization string.

Using the BCC

You can customize the modem initialization string for Hayes compatible modems.

Note: To set a modem initialization string for interfaces that use Raise DTR and V.25bis signaling, see "Modifying the Modem Command String" on page 10-10.

To configure a custom initialization string, you have to configure the **init-string** parameter. This parameter is valid only if the wan-type parameter is set to asynchronous and the media-type parameter is set to hayes.

To set the initialization string, navigate to the serial prompt and enter:

init-string *<string>*

string is an AT modem command string, which is an ASCII text string from 3 to 34 characters.

For example, to send a command to turn off the command echo, enter:

`serial/3/1#` **init-string E0**

Note: You must set the **init-string** parameter for external Hayes compatible modems. Consult the manual for your modem for valid initialization strings.

Using Site Manager

Using Site Manager, you can specify a particular modem for asynchronous interfaces that use Hayes signaling. Asynchronous interfaces are available for the AN, ASN, and ANH (using the Dual Sync Net module); ARN (using any serial expansion module); and BLN and BCN (using the Octal Sync Link module). For more information, see Chapter 5, "Implementation Notes for All Dial Services."

When you select a modem from the list, the AT initialization string is set automatically, as well as the speaker volume, speaker control, and number of rings to answer. (You can modify these default settings.) If your modem is not on the list, you can configure a custom modem and AT initialization command. The AT initialization command is required for custom modems. Appendix E lists the AT initialization commands for the ARN. Because your modem may use a different set of commands, consult the manual for your modem.

Entering an invalid command can disable the modem. If the modem does not initialize, you may need to change the asynchronous baud rate.

To access the window where you choose a modem, you must set the WAN Serial Interface Type parameter to Async and the Line Media Type set to Hayes.

To select a Hayes compatible modem:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector for the interface that requires a modem. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The Async Hayes Modem Interface window opens.
3. Set the **Modem Type** parameter. Click on **Help** or see the parameter description on page A-11.	
4. If you selected **Custom** for the modem type, set the **Modem Init String** parameter. Click on **Help** or see the parameter description on page A-12.	
5. Optionally, set the following parameters: • **Speaker Volume** • **Speaker Control** • **No. of Rings to Answer** Click on **Help** or see the parameter descriptions beginning on page A-13.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
6. Click on **OK**.	You return to the Edit Connector window.
7. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Modem Command String

You can change the modem initialization command string that the router sends to the modem. For example, you can enter a command string to change the speed of the modem. Also, if you are having trouble placing calls, you can enter a string to test whether the modem responds.

Using the BCC

To set the modem command string, navigate to the dial prompt and enter:

modem-command-string *<initialization_command>*

For example, to initiate a hang-up sequence, enter:

`dial/serial/3/3#` **modem-command-string H0**

Using Site Manager

To access the window where you specify the modem command string, set the WAN Serial Interface Type parameter to Synchronous or Asynchronous and set the Line Media Type to Raise DTR or V.25bis.

To change the modem initialization command:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector for the interface that you want to modify. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
2. Click on **Edit Modem**.	The Sync Modem or Async Modem Interface window opens.
3. Set the **Modem Command String** parameter. Note that Raise DTR and V.25bis signaling do not require a modem command string. Click on **Help** or see the parameter description on page A-12.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Changing the Asynchronous Baud Rate

The asynchronous baud rate sets the transmission speed between the modem and the serial interface. When setting this parameter, select a value that is greater than or equal to the speed of the modem. The default is 115,200 b/s.

Using the BCC

Set the asynchronous baud rate only when the **wan-type** parameter is set to asynchronous. To set the asynchronous baud rate, navigate to the serial prompt and enter:

async-baud-rate *<rate>*

rate can be:

Rate in Bits Per Second (b/s)				
1200b	7200b	14400b	38k	76k
2400b	9600b	19200b	56k	96k
4800b	12000b	28800b	64k	115k

For example:

```
serial/1/1# async-baud-rate 28800b
```

Using Site Manager

See *Configuring WAN Line Services* to configure this parameter using Site Manager.

Modifying How the Modem Connects to the Network

Using Site Manager, you can change how the modem connects to the network, for example, how many times it attempts to call and how frequently it retries the connection.

To change how the modem connects to the network:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose configuration you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The Sync Modem Interface, Async Modem Interface, or Async Hayes Modem Interface window opens.
3. Optionally, set any one of the following parameters: • **Retry Delay** • **Redial Count** • **Ring Indicator** • **Debug Mode** Click on **Help** or see the parameter descriptions beginning on page A-10.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the ARN Internal Modem Configuration

Using the BCC or Site Manager, you can modify the configuration of the V.34 Modem Adapter module that can be installed in the ARN.

Selecting a Modem Type and Specifying an Initialization String

To set the modem type for any dial-up interface, for asynchronous interfaces using Hayes signaling, you can specify a particular modem for your network. Asynchronous interfaces are on the AN, ASN, and ANH (using the Dual Sync net module); ARN (using any serial expansion module); and BLN and BCN (using the Octal Sync link module). For more information, see Chapter 5, "Implementation Notes for All Dial Services."

When you select a modem from the list, the AT initialization string is set automatically, as well as the speaker volume, speaker control, and number of rings to answer. (You can modify these default settings.) If your modem is not on the list, you can configure a custom modem and AT initialization command. The AT initialization command is required for custom modems. Appendix E lists the AT initialization commands for the ARN. Your modem may use a different set of commands; see the manual for your modem.

Entering an invalid command may disable the modem. If the modem does not initialize, you may need to change the asynchronous baud rate.

For more information about modem commands, see *Configuring WAN Line Services*.

Using the BCC

To set the modem type, navigate to the modem prompt and enter:

modem-type 0

The value 0 specifies a custom modem.

For example:

```
modem/3/3# modem-type 0
```

After you specify a custom modem, you must enter a modem initialization string. To configure a modem initialization string, configure the **init-string** parameter.

To set the initialization string, navigate to the modem prompt and enter:

init-string *<string>*

string is an AT modem command string, which is an ASCII text string from 3 to 34 characters.

For example, to send a command to turn off the command echo, enter:

```
modem/3/3# init-string E0
```

Using Site Manager

To set the initialization string for the ARN:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose configuration you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The V.34 Modem Interface Parameters window opens.
3. Set the **Modem Config String** parameter. See the parameter description on page A-15.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Changing the Asynchronous Baud Rate

When the **wan-type** parameter is set to asynchronous, the asynchronous baud rate determines the transmission speed between the modem and the serial interface. When setting this parameter, select a value that is greater than or equal to the speed of the modem. The default is 115,200 b/s.

To set the asynchronous baud rate using the BCC, navigate to the modem prompt and enter:

async-baud-rate *<rate>*

rate can be:

Rate in Bits Per Second (b/s)				
1200b	7200b	14400b	38k	76k
2400b	9600b	19200b	56k	96k
4800b	12000b	28800b	64k	115k

For example:

```
modem/1/1# async-baud-rate 28800b
```

To configure the asynchronous baud rate using Site Manager, see *Configuring WAN Lines Services.*

Using Modem Factory Defaults

For the ARN using the V.34 Modem Adapter module, you can specify whether exclusive use of the factory default modem initialization string is enabled or disabled. When the factory default string is enabled, the router sends only the default string (AT&d0&k3&X0S0=2S2=43) to the modem. When disabled, the router sends a user-specified initialization string after sending the default string.

Set the user-specified string in the Modem Config String parameter (Site Manager) or in the modem-init string (BCC). Commands in the user-specified string take precedence over the factory default command string.

Using the BCC

To enable or disable the factory default settings for the modem configuration, navigate to the modem prompt and enter:

factory-defaults-load *<state>*

state is enabled or disabled.

For example:

`modem/2/1#` **factory-defaults-load enabled**

Using Site Manager

To enable or disable the factory default settings for the modem configuration:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose configuration you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The V.34 Modem Interface Parameters window opens.
3. Set the **Modem Factory Defaults** parameter. Click on **Help** or see the parameter description on page A-16.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Configuring a Modem for a Specific Country

Using the BCC, you can ensure that the modem works for the country it is operating in.

To do so, navigate to the modem prompt and enter:

country-code *<region>*

region can be one of the following:

northamerica
uk
germany
japan

For example:

`modem/2/1#` **country-code northamerica**

Specifying the Phone Number to Dial

You can instruct the modem which phone to dial.

Using the BCC

To instruct the modem which phone number it should dial, navigate to the modem prompt and enter:

phone-number *<number>*

number is the phone number that you want the modem to dial.

For example:

`modem/2/1#` **phone-number 4856745**

Using Site Manager

To set the phone number:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose configuration you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The V.34 Modem Interface Parameters window opens.
3. Set the **Phone Number** parameter. Click on **Help** or see the parameter description on page A-16.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Resetting the Modem Remotely

Using the BCC, you can reset the modem remotely if there seems to be a problem with the call connection. Using this command causes the modem to terminate all its connections and drop any data.

To remotely reset the modem, navigate to the modem prompt and enter:

unit-reset <*value*>

value can be one of the following:

reset - Resets the modem.

cleared - Clears the current call.

For example:

`modem/2/1#` **unit-reset reset**

Modifying the Operation of the Modem

Using Site Manager, you can change the V.34 Modem Adapter module operation, for example, speaker volume and control, whether it originates or answers, and the type of dialing it uses.

To modify the V.34 Modem Adapter module operation:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the COM connector whose configuration you want to change. The connector name should have a D, B, or W next to it.	The Edit Connector window opens.
2. Click on **Edit Modem**.	The V.34 Modem Interface Parameters window opens.
3. Set the following parameters: • **Expert Config** • **Originate/Answer** • **Speaker Volume** • **Speaker Control** • **Set Pulse/Tone Dial Default** Click on **Help** or see the parameter descriptions beginning on page A-15.	
4. Click on **OK**.	You return to the Edit Connector window.
5. Click on **Done**.	You return to the Configuration Manager window.

Deleting Modem Lines from a Pool

You can delete modem lines from a pool using the BCC or Site Manager.

Caution: If you modify a modem line carrying an active circuit, the router terminates the circuit.

Using the BCC

To remove a modem line from a demand or backup pool:

1. **Remove the line from the line pool by navigating to the demand-line or backup-line prompt and entering:**

   delete

   For example:

   `backup-line/4/serial/3/1#` **delete**

2. **Remove the line as a dial object, making it an unconfigured serial interface. Navigate to the dial prompt and enter:**

   delete

   For example:

   `dial/serial/3/1#` **delete**

If a circuit is using the line pool with the line that you want to delete, the BCC will not let you delete the line.

Using Site Manager

To remove a modem line from a line pool:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select a pool entry at the top of the window.	The Pool ID for the selected entry appears in the Pool ID field.
4. Click on **Edit**.	The Lines Definition window opens.
5. Click on the COM connector.	Site Manager removes the D, B, or W next to the connector name. If this is the only line in the pool, Site Manager also deletes the pool.
6. Choose **File**.	The File menu opens.
7. Choose **Exit**.	You return to the Demand, Backup, or Bandwidth-on-Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Chapter 11
Customizing ISDN Lines

This chapter provides instructions on how to modify ISDN lines in a line pool. You should have already created line pools according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager,” or Chapter 3, “Starting Dial Services Using the BCC.”

You can use Site Manager to configure all three dial services; you can use the BCC to modify ISDN lines for dial-on-demand and dial backup.

This chapter includes the following information:

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Configuring Selective PRI Service	11-2
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Modifying the MCT1 and MCE1 Port Configurations

The default values for the port parameters work for most configurations; however, you can modify the physical interface of the MCT1 and MCE1 ports. To modify the MCT1 and MCE1 configurations, see *Configuring WAN Line Services*.

Modifying the BRI and PRI Modes of Operation

You cannot modify the BRI or PRI port application mode. You specify the mode of operation when you initially configure an ISDN interface. To change the mode, you must delete the interface and re-create it with a different mode.

To delete these interfaces, see "Deleting BRI and PRI from the Router" on page 11-22. To set the mode again, see "Creating Line Pools with ISDN Lines" on page 2-8 (Site Manager) or "Specifying the ISDN Switch Type" on page 3-17 (BCC).

Configuring Selective PRI Service

For most networks, you configure all of the available B channels for PRI service. If you purchase selective PRI service from your ISDN provider, you can modify the number of individual B channels for the interface.

Using the BCC

When configuring selective PRI service, select only the timeslots that the service provider assigns to you. For example, if your provider assigns you timeslots 1 through 4, select only slots 1 through 4.

To select individual timeslots, navigate to the pri prompt and enter:

channels {*<channel_n, channel_n, ...>***}**

dial

For example:

```
pri/2/1# channels {1 2 3 4}
pri/2/1# dial
```

Using Site Manager

To modify individual PRI timeslots:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an MCT1 or MCE1 connector.	The PRI Logical Lines window opens.
2. Click on a B channel.	The Timeslots window opens.
3. Select additional B channels or deselect existing B channels.	Site Manager does not let you remove B channels if the number of channels will be less than the number of timeslots used by the line pool.
4. Click on **OK**.	You return to the PRI Logical Lines window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the ISDN Pool Channel Count

You can modify the ISDN pool channel count to modify the number of available channels in a pool.

The pool channel count is part of the ISDN logical line configuration because it defines the logical B channels, not the physical line. Before changing the logical line configuration, you must delete all circuits associated with that pool. For instructions, see the appropriate customizing chapter for circuits.

Using the BCC

To modify the pool channel count, navigate to the demand-line or backup-line prompt and enter:

channel-count *<integer>*

integer is the number of B channels you are allocating for the backup pool.

For example, if you set the **channel-count** parameter to 5 and now want to remove 3 lines, enter:

```
backup-line/8/pri/3/1# channel-count 2
```

Using Site Manager

To modify the pool channel count and priority:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select the pool that contains the ISDN lines that you want to modify.	The Pool ID for the selected entry appears in the Pool ID field.
4. Click on **Edit**.	The Lines Definition window opens.
5. Click on an ISDN, MCT1, or MCE1 connector.	The ISDN Logical Lines window opens.
6. Set the **Pool Channel Count** parameter. Click on **Help** or see the parameter description on page A-25.	
7. Click on **OK**.	You return to the Lines Definition window.
8. Choose **File**.	The File menu opens.
9. Choose **Exit**.	You return to the Demand, Backup, or Bandwidth-on-Demand Pools window.
10. Click on **Done**.	You return to the Configuration Manager window.

Modifying the ISDN Channel Priority

You can modify the ISDN pool channel priority to prioritize channels in a pool, instructing the router which line to use first, second, and so on when a dial line is required. The lower the number you assign to an interface, the higher its priority.

The channel priority is part of the ISDN logical line configuration because it defines the logical B channels, not the physical line. Before changing the logical line configuration, you must delete all circuits associated with that pool. For instructions, see the appropriate customizing chapter for circuits.

For dial backup and bandwidth-on-demand pools, lines can reside across slots, but setting the line priority affects only lines on the same slot. For example, if the backup pool has two lines on slot 3 and two lines on slot 4, the router sets a priority between the lines on slot 3, then between the lines on slot 4. For bandwidth-on-demand, the router prioritizes lines in the preferred slot, then the reserved slot, and finally, the local slot.

Using the BCC

To prioritize ISDN lines in a demand or backup pool, navigate to the demand-line or backup-line prompt and enter:

isdn-pool-priority *<integer>*

integer is a number from 1 to 50.

For example:

```
demand-line/1/bri/1/1/2# isdn-pool-priority 1
```

This command tells the router to use the line for slot 3 connector 3 first for a backup line.

This parameter works with the **line-priority** parameter for serial lines. For example, if a pool has a serial line and an ISDN line, you can set the serial line to a **line-priority** of 1 and the ISDN line to an **isdn-pool-priority** of 2.

Using Site Manager

To modify the pool channel priority for demand, backup, and bandwidth pools:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select the pool that contains the ISDN lines that you want to modify.	The Pool ID for the selected entry appears in the Pool ID field.
4. Click on **Edit**.	The Lines Definition window opens.
5. Click on an ISDN, MCT1, or MCE1 connector.	The ISDN Logical Lines window opens.
6. Set the **Pool Channel Priority** parameter. Click on **Help** or see the parameter description on page A-26.	
7. Click on **OK**.	You return to the Lines Definition window.
8. Choose **File**.	The File menu opens.
9. Choose **Exit**.	You return to the Demand, Backup, or Bandwidth-on-Demand Pools window.
10. Click on **Done**.	You return to the Configuration Manager window.

Modifying the ISDN Switch Type

If the ISDN switch at the central office has changed, you need to alter the switch type in the router's configuration.

If you change the switch type, the router disconnects any existing calls while the ISDN software makes changes to account for the new switch. After the changes are made, the software restarts and you can reconnect.

Using the BCC

To modify the switch type, navigate to the isdn-switch prompt and enter:

switch-type *<switch>*

switch can be any one of the following:

brinet3	brintt	prikdd
briswissnet3	brits013	printt
bri5ess	brini1	prinet5
bridms100	pri4ess	prits014
brivn3	pri5ess	
brikdd	pridms100	

For example:

```
isdn-switch/2# switch-type bridms100
```

The default switch types are **brinet3** for BRI and **pri5ess** for PRI.

Using Site Manager

To modify the switch type:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Edit Switch Parameters**.	The ISDN Configured Switches window opens.
3. Set the **Switch Type** parameter. Click on **Help** or see the parameter description on page A-20.	
4. Click on **Done**.	You return to the Configuration Manager window.

Enabling Incoming Call Filtering

Incoming call filtering enables you to use caller ID service, which identifies the incoming caller. By enabling incoming call filtering, the router rejects any unauthorized caller. For more information about filtering incoming calls, see “Incoming Call Filtering” on page 5-16.

Using the BCC

To enable incoming call filtering, navigate to the isdn-switch prompt and enter:

incoming-filter *<state>*

state is on or off.

For example, to enable incoming filtering, enter:

```
isdn-switch/2# incoming-filter on
```

Using Site Manager

To enable incoming call filtering:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Edit Switch Parameters**.	The ISDN Configured Switches window opens.
3. Set the **Incoming Filter** parameter to **Enable**. Click on **Help** or see the parameter description on page A-22.	
4. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Adaption Rate

To send and receive data transmitting at a rate of 56 Kb/s across a 64 Kb/s line, you must modify the adaption rate. For more information about this feature, see “Rate Adaption” on page 5-17.

In accordance with the ITU-T V.110 standard, configuring the global adaption rate enables the router to send and receive data transmitting at a rate of 56 Kb/s and adapt it for transmission over a 64 Kb/s line.

Ensure that the rate you select is compatible with the network connections to the destination device. If you are unsure, ask your provider. The default is 64 Kb/s.

Using the BCC

To modify the adaption rate, navigate to the isdn-switch prompt and enter:

global-rate-adaption *<rate>*

rate can be one of the following:

rate64 - to communicate at a rate of 64 Kb/s across the B channel.
rate56 - to communicate at a rate of 56 Kb/s across the B channel.

For example, to set the adaption rate to 56 Kb/s, enter:

```
isdn-switch/2# global-rate-adaption rate56
```

The **global-rate-adaption** parameter works with the **adaption-rate** parameter in the outgoing phone list. To learn how to customize phone lists, see Chapter 15, “Customizing Phone Lists.”

Using Site Manager

To modify the adaption rate:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Edit Switch Parameters**.	The ISDN Configured Switches window opens.
3. Set the **Global Adaption Rate** parameter. Click on **Help** or see the parameter description on page A-23.	
4. Click on **Done**.	You return to the Configuration Manager window.

The Global Adaption Rate parameter works with the Adaption Rate parameter in the outgoing phone list (see Chapter 15, “Customizing Phone Lists”).

Informing the Switch That Call Setup Is Complete

Some switches require that the router send a packet in the call setup that includes all the information elements needed to complete the call setup. This makes call setup more efficient. This packet is called the sending complete information element.

Using the BCC

To enable the sending complete information element, navigate to the isdn-switch prompt and enter:

sending-complete *<state>*

state is enabled or disabled.

For example, to send an information element, enter:

```
isdn-switch/2# sending-complete enabled
```

The default is disabled.

Using Site Manager

To enable the use of an information element:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Edit Switch Parameters**.	The ISDN Configured Switches window opens.
3. Set the **Sending Complete IE** parameter to **Enable**. Click on **Help** or see the parameter description on page A-22.	
4. Click on **Done**.	You return to the Configuration Manager window.

Configuring X.25 over a D Channel (BRI Only)

Using the BCC or Site Manager, you can configure X.25 over a D channel. This feature is only for NET3 switch types in Germany and France.

To reduce the cost of connecting to an X.25 network, you can send X.25 packets over an ISDN D channel instead of sending them over leased lines. To use the D channel for X.25 packet transmission, the baud rate must be a maximum of 9600 b/s so that data is not lost. For more information about this feature, see “X.25 Service over an ISDN D Channel (BRI Only)” on page 5-18.

Caution: If you enable or disable this feature dynamically, the router disconnects all existing calls across the B channels while the ISDN software makes the necessary changes. After the changes are complete, the software restarts and you can make calls again.

You should have already created BRI service according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC.” To enable this feature, go to one of the following sections.

Using the BCC

You can enable or disable X.25 service over the D channel for each BRI line. To do so, navigate to the bri prompt and enter:

x25-isdn-dchannel <*state*>

state is enabled or disabled. The default is disabled.

For example:

`bri/1/1/#` **x25-isdn-dchannel enabled**

If you enable X.25 service over the D channel, you must configure the TEI type and value to communicate with the ISDN switch.

Configuring the TEI Type

The **x25-tei-type** parameter specifies how you choose to configure the TEI value for the DTE. You can preassign the identifier value at the time you order ISDN service, or the router can learn the value from the switch dynamically when you place a call and the line becomes active. Either way, the switch assigns this value.

To specify the TEI type enter:

x25-tei-type <*type*>

type can be:

fixed - Tells the router that you will enter the identifier assigned by the switch before placing any calls.

auto - Tells the router that it learns the identifier dynamically when the line is active.

Configuring the TEI Value

The **x25-tei-value** parameter assigns a number to the X.25 DTE to identify it to the ISDN switch. This parameter is available only if you enable X.25 over the D channel for a fixed TEI type.

To configure the value enter:

x25-tei-value *<integer>*

integer is a value from 0 to 63.

Enter the TEI value that the switch provider assigned when you ordered ISDN service. If the TEI type is set to auto, ignore this parameter.

For example:

`bri/1/1#` **x25-tei-type fixed x25-tei-value 7**

To disable X.25 over the D channel, go to "Disabling X.25 over the D Channel" on page 11-14.

Using Site Manager

To configure X.25 over the D channel for a BRI line:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an ISDN connector.	The ISDN Dialup window opens.
2. Click on **Edit D Chan**.	The BRI Interface Configuration window opens.
3. Set the **X.25 over ISDN-D Channel** parameter to **Enable.** Click on **Help** or see the parameter description on page A-30.	
4. Set the following parameters, if necessary: • **TEI Type for X.25 over ISDN-D** • **TEI Value for X.25 over ISDN-D** Click on **Help** or see the parameter descriptions beginning on page A-30.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Click on **OK**.	If this is the first BRI line that you are configuring, the ISDN Switch Configuration window opens. Otherwise, you return to the ISDN Dialup window.
6. If the ISDN Switch Configuration window is open, click on **OK**. Otherwise, skip to step 7.	The X.25 Packet and Service configuration windows open. You must configure certain parameters in each of these windows. See *Configuring X.25 Services* for instructions. When you exit from the X.25 windows, you return to the ISDN Dialup window.
7. Click on **Done**.	You return to the Configuration Manager window.

To disable X.25 over the D channel, go to "Disabling X.25 over the D Channel" on page 11-14.

Note: Site Manager modifies the ranges that you can set for certain packet and service parameters to accommodate data over the D channel.

Disabling X.25 over the D Channel

You can globally disable X.25 over the D channel using the BCC or Site Manager. Disabling this feature globally disables the feature on a per-slot basis.

Using the BCC

To disable X.25 over the D channel globally, navigate to the isdn-switch prompt and enter:

x25-over-isdn disabled

For example:

```
isdn-switch/2# x25-over-isdn disabled
```

Using Site Manager

When you configure X.25 over the D channel, Site Manager automatically enables the Global X.25 over ISDN-D Channel parameter in the ISDN Configured Switches window. If you disable this parameter, it disables the feature on a per-slot basis. For routers with only one slot, disabling this parameter removes the feature from the router altogether.

To disable X.25 over the D channel:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Edit Switch Parameters**.	The ISDN Configured Switches window opens.
3. Set the **Global X.25 over ISDN-D Channel** parameter to **Disable**. Click on **Help** or see the parameter description on page A-23.	
4. Click on **Done**.	You return to the Configuration Manager window.

Modifying BRI Signaling over the D Channel

In most cases, the defaults for BRI signaling will work for your network; however, you can modify the parameters.

Note: Nortel Networks recommends that you use the default BRI signaling configuration unless you are instructed otherwise by Nortel Networks technical support or your ISDN provider.

Using the BCC

You enter commands to modify BRI signaling at the bri prompt.

Modifying LAPD Transmission Units

To specify the maximum number of bytes per LAPD transmission unit, enter:

mtu *<integer>*

integer is a value from 3 to 1024 bytes.

For example:

```
bri/1/1# mtu 500
```

Nortel Networks recommends that you accept the default, 400 bytes.

Activating ISDN S/T and U Interfaces

You can set the BRI T3 timer which indicates the amount of time that the router has to try and activate the ISDN S/T or U interface (ARN only). The router starts this timer when the ISDN interface is deactivated and the router tries to activate it, for example, when the router wants to send data. During this period, the router sends INFO 1 frames across the ISDN interface until the network responds with a signal or the timer expires. This timer prevents the router from attempting to activate the ISDN interface interminably.

To modify the T3 timer, enter:

t3-timer *<integer>*

integer is a value from 1 to 30 seconds.

For example:

```
bri/1/1# t3-timer 10
```

The **t3-timer** parameter should be greater than the time it takes to activate the ISDN interface under normal conditions. Ask your ISDN provider for guidelines regarding the subscriber loop transmission, which may affect the value you set.

Modifying the BRI T4 Timer

The BRI T4 timer indicates the amount of time that the router waits for the line to recover from a deactivated state. This timer prevents brief, minor disturbances on a noisy line from forcing the router to deactivate the circuit. Instead, the router waits to see whether the line recovers within the T4 timer period. This enables the router to suppress minor line problems from the upper-layer protocols.

To modify the T4 timer, enter:

t4-timer *<integer>*

integer is a value from 500 to 1000 milliseconds.

For example:

`bri/1/1#` **t4-timer 600**

If your line is noisy, enter the maximum amount of time that the router should wait for the line to reactivate.

Customizing Conformance Testing

The **bchannel-loopback** parameter is for layer 1 ISDN BRI conformance testing. It allows the external equipment to send data to the router over the B channels and loop it back out the S/T or U interface (ARN only). The external equipment can verify its physical connection to the router.

To enable a test, enter:

bchannel-loopback enabled

The default is disabled.

For example:

`bri/1/12#` **bchannel-loopback enabled**

Do not enable this parameter when the router is in normal operational mode.

Modifying the BRI Line Configuration

You can specify whether you have a point-to-point (PTP) or multipoint (MTP) configuration on the BRI line.

To specify the line configuration, enter:

line-type *<type>*

type can be ptp or mtp.

For example:

`bri/1/1#` **line-type ptp**

Enter the value for the type of line supplied by your ISDN provider. If you have a PTP line connected to a 5ESS switch, you do not need to configure SPIDs.

Using Site Manager

The BRI Interface Configuration window defines the signaling over the D channel. To modify BRI signaling over the D channel:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on a configured ISDN connector.	The ISDN Dialup window opens.
2. Click on **Edit D Chan**.	The BRI Interface Configuration window opens.
3. In the BRI Interface Configuration window, set the following parameters: • **Acceptable LAPD MTUs** • **BRI T3 Timer** • **BRI T4 Timer** • **BRI B Channel Loopback** • **BRI Line Type** Click on **Help** or see the parameter descriptions beginning on page A-27.	
4. Click on **OK**.	You return to the ISDN Dialup window.
5. Click on **Done**.	You return to the Configuration Manager window.

Another way to modify the BRI line is to select a configured ISDN interface and click on Edit Line instead of Edit D Chan, as described in the previous table. The BRI Interface Configuration window opens and you can modify the BRI signaling parameters.

Modifying the X.25 Circuit for Service over the D Channel

Using Site Manager, you can modify the X.25 service and packet parameters after you enable X.25 service over the D channel. This feature is only for NET3 switch types in Germany and France.

To modify the X.25 circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the ISDN connector.	The Edit Connector window opens.
2. Click on **Edit Circuit**.	The Circuit Definition window opens.
3. Choose **X.25 Protocol**.	The X.25 Protocol menu opens.
4. Choose **Packet** to modify the packet configuration or **Service** to modify the service configuration. Click on **Help** or see *Configuring X.25 Services* for parameter descriptions.	
5. Click on **OK**.	

Modifying BRI Leased-Line Service (Germany and Japan Only)

If you selected one of the leased modes for BRI operation, you can modify the BRI leased-line configuration using the BCC.

There is a leased-line configuration for each of the two B channels. If you list the objects for the leased BRI interface, the BCC displays either one leased-line object (for leased 128K) or two leased-line objects, for example:

```
bri/1/1# lso
leased-line 1/1/1 leased-line 1/1/2
```

The following sections explain how to modify a BRI leased line.

Changing the Circuit Name

To change the circuit name of the BRI leased-line configuration, navigate to the leased-line prompt from the bri prompt and enter:

circuit-name *<string>*

string can be any text string representing a circuit name.

For example, enter:

```
leased-line/1/1/1# circuit-name corp1
```

Modifying the MTU

The maximum transmission unit (MTU) specifies the largest frame that the router can transmit on this line. The default is 1600.

To modify the line's MTU value, navigate to the leased-line prompt and enter:

mtu *<integer>*

integer is a number from 3 to 4608.

For example:

```
leased-line/1/1/1# mtu 2000
```

Disabling the Leased Line

If you want to temporarily disable the leased-line interface, you can change the state of the line from enabled, which is the default, to disabled. To do this, navigate to the leased-line prompt and enter:

state <*state*>

state is enabled or disabled.

For example:

```
leased-line/1/1/1# disabled
```

Modifying the BRI T4 Timer

Using Site Manager, you can edit a timer for the BRI leased line. Although call setup is not performed on the D channel, the ISDN switch uses the D channel to send and receive bits that activate and deactivate the ISDN interface. You may want to edit the D channel for your leased-line configuration.

If noise or other minor problems on the network cause the router to deactivate the line frequently, you can modify the BRI T4 timer to prevent this from happening.

To modify the BRI T4 timer:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an ISDN connector that is configured as a leased line.	The ISDN Leased Line B Channels window opens.
2. Click on **Edit D Chan**.	The BRI Interface Configuration window opens.
3. Set the **BRI T4 Timer** parameter. Click on **Help** or see the parameter description on page A-28.	
4. Click on **OK**.	You return to the ISDN Leased Line B Channels window.
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Interframe Time Fill Pattern

The interframe time fill (IFTF) indicates the signal pattern that the router transmits when there is no data going across a particular channel. You can modify this pattern to suit your network.

To modify the interframe time fill pattern:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an ISDN connector that is configured as a leased line.	The ISDN Leased Line window opens.
2. Set the **Inter Frame Time Fill** parameter. Click on **Help** or see the parameter description on page A-32.	
3. Click on **Done**.	The Edit Connector window opens.
4. Click on **Done**.	You return to the Configuration Manager window.

Deleting BRI and PRI from the Router

Before you delete the BRI and PRI physical interface, you must delete the dial-up circuits and pools.

Using the BCC

To remove BRI from the router, navigate to the BRI prompt and enter:

delete

For example:

`bri/1/1#` **delete**

To remove PRI from the router, navigate to the PRI prompt and enter:

delete

For example:

`pri/3/2#` **delete**

Using Site Manager

To remove BRI from the router:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on the ISDN connector.	The ISDN Dialup window opens.
2. Click on **Delete All**.	Site Manager removes BRI service.
3. Click on **Done**.	You return to the Configuration Manager window.

To remove PRI from the router:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, click on an MCT1 or MCE1 connector.	The PRI Logical Lines window opens.
2. Click on **Delete PRI**.	Site Manager removes PRI service.
3. Click on **Done**.	You return to the Configuration Manager window.

Deleting ISDN B Channels from a Pool

You can remove B channels from a line pool using the BCC or Site Manager.

Using the BCC

To remove B channels from a line pool, complete the following steps:

1. **Remove an ISDN backup line from a line pool by navigating to the demand or backup-line prompt and entering:**

   delete

   For example:

   `demand-line/4/bri/2/1#` **delete**

2. **Remove the line as a dial object, making it an unconfigured serial interface. Navigate to the dial prompt and enter:**

   delete

   For example:

   `dial/bri/2/1#` **delete**

The BCC will not let you delete a dial line when the pool is in use by a circuit.

Using Site Manager

To remove B channels from a line pool:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Pools**.	The Demand, Backup, or Bandwidth-on-Demand Pools window opens.
3. Select a pool containing the ISDN lines that you want to delete.	The Pool ID for the selected entry appears in the Pool ID field.
4. Click on **Edit**.	The Lines Definition window opens.
5. Click on an ISDN, MCT1, or MCE1 connector.	The ISDN Logical Lines window opens.
6. Click on **Remove**.	Site Manager removes the B channels from the pool. If you remove all the lines in the pool, Site Manager removes the pool as well.
7. Click on **OK**.	You return to the Lines Definition window.
8. Choose **File**.	The File menu opens.
9. Choose **Exit**.	You return to the Demand, Backup, or Bandwidth-on-Demand Pools window.
10. Click on **Done**.	You return to the Configuration Manager window.

Chapter 12
Customizing Demand Circuits

For PPP configurations only, you should have set up a demand pool according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3 “Starting Dial Services Using the BCC,” and added PPP demand circuits.

This chapter includes the following information:

Topic	Page
Adding Frame Relay Demand Circuits	12-2
Modifying the Frame Relay Interface	12-3
Customizing Demand Circuit Operation	12-8
Adding Bandwidth Service for Demand Lines (PPP Only)	12-36
Adding Layer 3 Protocols to PPP Demand Circuits	12-36
Scheduling Demand Circuit Availability	12-37
Configuring Demand Circuit Groups	12-46
Removing Demand Circuits	12-52

For information about PPP and frame relay, see *Configuring PPP Services* and *Configuring Frame Relay Services*.

Adding Frame Relay Demand Circuits

You can configure frame relay demand circuits as part of a dial interface using the BCC or Site Manager.

Using the BCC

To add a frame relay demand circuit to an interface, navigate to the demand-circuit prompt and enter:

frame-relay

For example, to add frame relay to the demand circuit named to-phoenix, enter:

```
demand-circuit/to-phoenix# frame-relay
```

The BCC returns the following prompt:

```
frame-relay/to-phoenix#
```

You are now in the frame relay context, where you can access frame relay interface parameters.

When you configure frame relay over a demand circuit, the BCC automatically deletes the default protocol object, PPP, from that demand circuit.

Using Site Manager

To configure frame relay demand circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Select a demand pool and click on **FR Circuits**.	The FR Demand Circuits window opens.
4. Click on **Add**.	Site Manager displays the new circuit along with its defaults. The circuit uses the demand pool that you previously selected.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Repeat step 4 for each demand circuit that you want to add.	
6. To modify the circuit defaults, see "Customizing Demand Circuit Operation" on page 12-8.	
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Frame Relay Interface

After you add a frame relay demand circuit, you can modify the frame relay interface. The interface parameters define the frame relay characteristics of the circuit, not the operation of the demand circuit itself.

Using the BCC

Modifying a frame relay demand circuit is the same as modifying any frame relay circuit; that is, you navigate to the frame relay circuit prompt and then modify the values of the frame relay parameters:

For example, to set the congestion timer to 1.5 seconds, enter:

```
frame-relay/to-phoenix# congestion-timer 1.5
```

From the frame relay demand circuit prompt, you can access the following frame relay objects and modify the parameters associated with these objects:

- default-service
- dlcmi
- lapf
- schedule
- service
- signaling

For example, to modify DLCMI parameters for the demand circuit to-phoenix, enter:

```
frame-relay/to-phoenix# dlcmi
```

For more information about each frame relay interface parameter and how to modify all aspects of frame relay service, such as service records, PVCs, and SVCs, see *Configuring Frame Relay Services.*

Using Site Manager

To modify a frame relay demand circuit using Site Manager, you access the frame relay configuration windows from the Dialup menu.

To modify the frame relay interface:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **FR Circuits**.	The FR Demand Circuits window opens.
4. Click on **Demand Intf**.	The FR Demand Interface List window opens.
5. Set any frame relay interface parameters. Click on **Help**, or see *Configuring Frame Relay Services*.	
6. Click on **Apply**, and then click on **Done**.	You return to the FR Demand Circuits window.
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Adding a Service Record

To add a service record:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **FR Circuits**.	The FR Demand Circuits window opens.
4. Click on **Demand Intf**.	The FR Demand Interface List window opens.
5. Click on **Services**.	The Frame Relay Demand Service List window opens. Site Manager supplies the service name.
6. Modify the **Service Name** parameter only if you are sure that the new name is unique for the router. Click on **Help** or see *Configuring Frame Relay Services*.	
7. Click on **Add** to create a service record.	The Frame Relay Service Add window opens.
8. Set the **DLCI Number** then click on OK. Click on **Help** or see *Configuring Frame Relay Services*.	You return to the Frame Relay Demand Service List window.
9. Click on **Done** until you return to the Configuration Manager window.	

Adding or Modifying PVCs

To add or modify PVCs:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **FR Circuits**.	The FR Demand Circuits window opens.
4. Click on **Demand Intf**.	The FR Demand Interface List window opens.
5. Click on **Services**.	The Frame Relay Demand Service List window opens. Site Manager supplies the service name.
6. Click on **PVCs** to configure PVCs for the service record.	The FR PVC List for Demand Service window opens.
7. Click on **Add** to add a PVC to the service record.	The Frame Relay PVC Add window opens.
8. Enter a value for the **DLCI Number** parameter, and then click on **OK**.	You return to the FR PVC List for Demand Service window.
9. Set the PVC parameters. For information about these parameters, frame relay service records, and PVCs, see *Configuring Frame Relay Services*.	
10. Click on **Done** until you return to the Configuration Manager window.	

Adding Layer 3 Protocols to Frame Relay Demand Circuits

Using Site Manager, you can add layer 3 protocols to the frame relay demand circuit. To add protocols:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **FR Circuits**.	The FR Demand Circuits window opens.
4. Select a circuit, then click on **Demand Intf**.	The FR Demand Interface List window opens.
5. Click on **Services**.	The Frame Relay Demand Service List window opens.
6. Choose **Protocols**.	The Protocols menu opens.
7. Choose **Add/Delete**.	The Select Protocols window opens.
8. Select one or more protocols for this demand circuit, then click on **OK**.	For each protocol you select, Site Manager displays windows that require information. Consult the appropriate protocol manual.
9. Click on **Done** until you return to the Configuration Manager window.	

Customizing Demand Circuit Operation

After you configure a PPP or frame relay demand circuit, you can customize the circuit's parameter defaults. The demand circuit parameters determine how the demand circuit operates and what demand circuit features it uses.

You can modify demand circuits using the BCC or Site Manager.

Forcing the Circuit to Activate or Deactivate

You can force the router to immediately activate or deactivate a demand circuit using the BCC or Site Manager.

Using the BCC

To force the demand circuit to activate, navigate to the demand-circuit prompt and enter:

force-dial enabled

For example, to activate the demand circuit to Boston, enter:

```
demand-circuit/circuit-to-Boston# force-dial enabled
```

The default for this parameter is disabled.

To force the demand circuit to terminate, navigate to the demand-circuit prompt and enter:

force-take-down enabled

For example, to deactivate the demand circuit to Boston, enter:

```
demand-circuit/circuit-to-Boston# force-take-down enabled
```

The default for this parameter is disabled.

Using Site Manager

To force the circuit to activate or terminate:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Force Dial** • **Force Take Down** Click on **Help** or see the parameter descriptions beginning on page A-35.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Deactivating the Circuit Due to Inactivity

You can configure the router to terminate a circuit if there is no data going across the connection. The inactivity time measures the data inactivity on the line. Specifically, it determines the number of seconds that can elapse without data activity before the router disconnects the line. Each time data passes through the router, the inactivity time resets. Together with the inactivity mode, the router determines how it should monitor inactivity.

After the router concludes that there is no data activity, it disconnects the line.

Note: The router does not consider LQR, LCP, and periodic CHAP messages as data, so they do not reset the inactivity time.

The following sections tell you how to set the inactivity time.

Using the BCC

To terminate the demand circuit based on inactivity, navigate to the demand-circuit prompt and enter:

inactivity-time *<integer>*

integer is the number of seconds from 1 to 99,999,999.

The value you set is the amount of time that the router waits before deactivating the switched connection.

For example, to set the inactivity time for circuit-to-Boston, enter:

```
demand-circuit/circuit-to-Boston# inactivity-time 120
```

If you want the connection to remain active at all times, enter 99,999,999. The connection remains active unless the network deactivates the connection. If the connection is deactivated, the router redials the same number when the next packet is ready for transmission. You can also manually force the router to establish a connection if a line is available using the **force-dial** command.

Using Site Manager

To terminate the demand circuit based on inactivity:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the **Inactivity Time** parameter. Click on **Help** or see the parameter description on page A-36.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Retrying the Connection

You can specify the number of attempts that the router makes to establish the demand circuit. In addition, you can configure how long the router waits between each retry attempt before trying to reestablish the circuit.

When establishing a connection, the router tries all the phone numbers in the outgoing phone list for a given line. If no connection is made and there is still data to send, the router increments the retry count, then retries these numbers using the next line in the pool.

The following sections provide instructions for setting the number of retries using the BCC or Site Manager.

Using the BCC

To set the number of times that you want the router to try to establish the circuit, navigate to the demand-circuit prompt and enter:

redial-count *<integer>*

integer is a value from 1 to 10. The default is 2.

For example, to retry the circuit to Boston three times, enter:

```
demand-circuit/circuit-to-Boston# redial-count 3
```

To specify how long the router waits between retry attempts, navigate to the demand-circuit prompt and enter:

redial-delay *<integer>*

integer is a number from 1 to 60 seconds. The default is 3.

Enter the amount of time that you want the router to wait before trying the next line in the pool. The amount of time you choose depends on the time it typically takes the network to recover.

For example, to wait 15 seconds between attempts, enter:

```
demand-circuit/circuit-to-Boston# redial-delay 15
```

Using Site Manager

To retry the connection if it fails:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Retry Max** • **Retry Delay** Click on **Help** or see the parameter descriptions beginning on page A-36.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Specifying Which Router Initiates a Call

To determine the role of each router when two routers try to establish a demand circuit with one another at the same time, you need to define the connection mode of each router. Both routers in a demand configuration can initiate a call. If a collision occurs, each router refers to the value of the **connection-mode** parameter to determine whether to initiate subsequent calls or whether to wait and receive calls.

The following sections explain how to set the connection mode.

Using the BCC

To specify which router places a call first, navigate to the PPP circuit prompt and enter:

connection-mode *<mode>*

mode can be no-dial, collision-master, or collision-slave. The default is collision-master.

To avoid continual collisions, configure one router as collision-master and the other as collision-slave. After an initial collision, each router will then follow the role assigned by this parameter. To ensure that a router receives calls, but never initiates calls, enter no-dial.

For example:

`ppp/circuit-to-Boston#` **connection-mode collision-master**

Using Site Manager

To specify which router places a call first:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the **Connection Mode** parameter. Click on **Help** or see the parameter description on page A-37.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Terminating a Failed Connection and Using Another Connection

For applications where there are two paths to the same destination, you can configure the router to automatically terminate a failed demand circuit and send the data over the other path to the destination. Note that the router does not terminate the circuit until it reaches the maximum number of connection attempts, which you specify using the retry-count parameter (BCC) or the Retry Max parameter (Site Manager).

Using the BCC

To terminate a failed connection and send data across another path to the same destination, navigate to the demand-circuit prompt and enter:

auto-demand-termination enabled

The default is disabled.

Enable this parameter when the router continues to advertise a static route over a demand circuit, but cannot establish a connection over that circuit. The router terminates the demand circuit, which notifies the routing protocol that the static routes associated with this circuit are no longer active. The router then uses the alternative path. To use the auto-demand-termination feature, you must have already set up an alternative path to the remote destination.

For example, to ensure that data reaches the Boston office, enter:

`demand-circuit/to-Boston#` **auto-demand-termination enabled**

To instruct the router when to reestablish the demand connection after an autodemand termination, navigate to the demand-circuit prompt and enter:

auto-demand-termination-reset *<integer>*

integer is a number from 1 to 999,999 minutes. The default is 60 minutes.

Specify the amount of time, in minutes, that the router waits before reestablishing the demand circuit after an autodemand termination. Enter an amount of time that allows the network to recover or that allows your network administrator to resolve the problem. After the router reestablishes the demand circuit, the protocols readvertise the static routes for this demand circuit.

You must enter a value for this parameter if you enabled the **auto-demand-termination** parameter.

Using Site Manager

To terminate a failed connection and send data across another path:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Auto Demand Termination** • **Auto Demand Term. Reset** Click on **Help** or see the parameter descriptions on page A-38.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Modifying PPP Authentication Information

To configure PPP authentication, you can use CHAP or PAP. For instructions on configuring CHAP authentication, see Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC.”

For detailed information about CHAP and PAP, see Chapter 5, “Implementation Notes for All Dial Services.”

Using the BCC

Changing the Authentication Protocol

CHAP is the default authentication protocol. To change the authentication protocol, navigate to the dial prompt and enter:

authentication-protocol <*protocol*>

protocol can be pap, chap, or none.

For example, to switch from the default protocol to PAP, enter:

`dial/serial/1/1#` **authentication-protocol pap**

Modifying CHAP

If you configure CHAP as the authentication protocol, you must configure a CHAP name and secret.

The *CHAP name* is part of the outbound call and informs remote peer routers of the local router's identity. The *CHAP secret* is for identification and security, and must be the same on both sides of the link.

To change the CHAP name and secret, navigate to the ppp circuit prompt and enter:

chap-name <*text-string*> **chap-secret** <*text-string*>

text-string can be any text string up to 20 characters.

For example, to modify CHAP for the demand circuit to phoenix, enter:

`ppp/to-phoenix#` **chap-name bayrs1 chap-secret southwest**

Note that each circuit must have a unique CHAP name.

Modifying PAP

If you configure PAP as the authentication protocol, you must configure a PAP ID and PAP password. The PAP ID identifies the calling router to the called router. During the authentication phase, all password authenticate-request messages that the calling router sends to the called router must include the correct PAP ID and password or the connection will not succeed.

To specify the PAP ID and password, navigate to the ppp circuit prompt and enter:

pap-id <*text-string*> **pap-password** <*text-string*>

text-string can be any text string up to 25 characters.

For example, to modify PAP for the demand circuit to phoenix, enter:

```
ppp/to-phoenix# pap-id bayrs pap-password admin
```

Configuring Outbound Authentication

Outbound authentication specifies whether the router performs authentication when it places an outbound call. Disabling outbound authentication improves interoperability with devices that do not perform two-way authentication or support CHAP.

Accept the default, enabled, if you want to use two-way authentication; that is, if each side of the connection will authenticate the other's identity. Select disabled to use one-way authentication, which means that only the router receiving the call performs authentication.

If you disable this parameter to use one-way authentication, you must enable the PPP Fallback parameter, which is part of the PPP interface configuration. You can set this parameter only using Site Manager. For information about the PPP Fallback parameter, see *Configuring PPP Services.*

To specify whether the router performs authentication when it places an outbound call, navigate to the ppp circuit prompt and enter:

outbound-authentication <*state*>

state is enabled or disabled.

For example, to disable outbound authentication for the demand circuit to phoenix enter:

```
ppp/to-phoenix# outbound-authentication disabled
```

Using Site Manager

To modify the authentication information:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **CHAP Local Name** • **CHAP Secret** • **PAP Local ID** • **PAP Password** • **Outbound Authentication** Click on **Help** or see the parameter descriptions beginning on page A-46.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

To change the authentication protocol from the default CHAP to PAP, you need to access a PPP configuration window. To select PAP, you must open the PPP Interface List window, select the line record for dial lines, and specify PAP for the Local Authentication Protocol parameter. For more information about PPP and configuring authentication protocols, see *Configuring PPP Services*.

Specifying the Duration of the Circuit

You can specify how long the connection is active using the BCC or Site Manager.

Using the BCC

Specifying the Maximum and Minimum Time the Circuit Is Active

The **max-uptime** parameter specifies the maximum duration of a call for a continuous period of time, which ensures that the connection is not up longer than necessary. For example, configure the circuit's availability from 9:00 a.m. to 5:00 p.m. Then set this parameter to 60 minutes. If the connection activates at 10:00 a.m., the router keeps the circuit active until 11:00 a.m.

To specify the maximum amount of time that the circuit is active, in minutes, navigate to the demand-circuit prompt and enter:

max-uptime <*integer*>

integer is a number from 1 to 999999. The default is 60 minutes.

For example, to specify a max uptime of 100 for the circuit to-phoenix, enter:

```
demand-circuit/to-phoenix# max-uptime 100
```

The **minimum-call-duration** parameter specifies the minimum amount of time that the connection remains active regardless of whether there is data traffic.

To configure the minimum amount of time the connection should remain active navigate to the demand-circuit prompt and enter:

minimum-call-duration <*integer*>

integer is a number from 10 to 2,147,483,647 seconds. The default is 60 seconds.

For dial-optimized routing circuits, this timer should allow enough time to send all routing updates to the remote nodes in the network.

For example, to specify a minimum duration of 80 seconds, enter:

```
demand-circuit/to-phoenix# minimum-call-duration 80
```

Terminating and Resetting the Circuit

The **max-uptime-termination** parameter automatically deactivates the circuit if the call reaches the maximum time that you specify using the **max-uptime** parameter. If the router receives data after the circuit is down, the router does not establish a demand connection.

To enable the max-uptime-termination parameter, navigate to the demand-circuit prompt and enter:

max-uptime-termination enabled

The default is disabled.

For example, to ensure the demand circuit to phoenix is disconnected after the maximum amount of time, enter:

`demand-circuit/to-phoenix#` **max-uptime-termination enabled**

The **uptime-termination-reset** parameter determines the amount of time the router waits before making the demand circuit available again after an uptime termination. The circuit is not established at this point, but the next time the router receives data, the circuit will be available and the router can activate it. The router invokes this timer only when you set the **maxtime-uptime-termination** parameter.

To specify when the demand circuit is reset after termination, navigate to the demand-circuit prompt and enter:

uptime-termination-reset <*integer*>

integer is a number from 1 to 999,999 minutes. The default is 60 minutes.

For example, to reset the circuit after 30 minutes, enter:

`demand-circuit/to-phoenix#` **uptime-termination-reset 30**

Using Site Manager

To set the duration of a demand circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Maximum Up Time** • **Minimum Call Duration** • **Max UpTime Termination** • **UpTime Term. Reset** Click on **Help** or see the parameter descriptions beginning on page A-51.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Setting the Inactivity Mode

The inactivity mode measures data inactivity for a specific direction across a line. Specifically, it lets you decide in which direction the router determines inactivity. Together with the inactivity time parameter, this parameter informs the router to deactivate the connection if there is no data going in the specified direction.

Note: The router does not consider the following as data, so it does not consider them when determining inactivity: PPP LQR, LCP, and periodic CHAP messages, frame relay DLCMI, and other signaling messages.

You can set the inactivity mode using the BCC or Site Manager.

Using the BCC

To configure the inactivity-mode parameter, navigate to the demand-circuit prompt and enter:

inactivity-mode <*mode*>

mode can be:

both-direction - If the router does not receive data and does not transmit data, it terminates the connection. The inactivity has to be in both directions. This is the default value.

transmit-only - If there is no data to transmit, the router terminates the connection. The router disregards data it receives. Select this option if you are using dial-optimized routing for IPX.

receive-only - If the router does not receive data, it terminates the connection.

either-direction - If the router does not receive or transmit data, it terminates the connection. The inactivity can be in either direction.

For example, to set the inactivity-mode for the circuit to-phoenix, enter:

```
demand-circuit/to-phoenix# inactivity-mode receive-only
```

Using Site Manager

To set the inactivity mode:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the **Inactivity Mode** parameter. Click on **Help** or see the parameter description on page A-54.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Changing the Demand Circuit Name

Each demand circuit has a unique circuit name. Using Site Manager, you can modify the circuit name.

When you add a demand circuit to an interface, Site Manager automatically assigns a circuit name, for example, Demand 1.

To modify the circuit name:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Select the circuit that you want to modify.	
5. Set the **Circuit Name** parameter. Click on **Help** or see the parameter description on page A-39.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Enabling Dial-Optimized Routing

Dial-optimized routing lets you exchange IP RIP and IPX RIP/SAP routing updates only when a connection is active. You can enable dial-optimized routing using only Site Manager; this feature is not configurable using the BCC.

When you enable dial-optimized routing for frame relay demand circuits, you must also set the Routing Update Hold Time parameter. This parameter instructs the router to wait for an active connection to the destination device before sending RIP or SAP routing updates.

This timer is necessary if the UNI between the router and the switch is a dynamic UNI, which means that the router learns the PVCs when it calls the frame relay switch. The router contacts the switch for the first time using a statically configured PVC. If the router sends routing updates over the static PVC, they will not go over the PVCs that connect to the destination. By setting the Routing Update Hold Time to a large enough value, you ensure that the updates are sent to the destination.

For more information about using dial-optimized routing to limit broadcast traffic, see Chapter 6, “Dial-on-Demand Implementation Notes.”

To enable dial-optimized routing:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the **Dial Optimized Routing** parameter. Click on **Help** or see the parameter description on page A-39.	
6. For a frame relay circuit, set the **Routing Update Hold Time** parameter. Click on **Help** or see the parameter description on page A-40.	
7. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Configuring Standby Circuits

A standby circuit is a type of demand circuit that gives the router another path to the destination. The destination can be a different interface at the primary circuit's original site or an entirely different site.

Standby circuits can be configured for asynchronous (RS-449), synchronous (RS-449, V.35, RS-422, and X.21), and ISDN interfaces. PPP is the only layer 2 protocol that you can configure over a standby circuit; you cannot use frame relay.

Guidelines for Configuring Standby Circuits

A standby circuit must be configured at the central site and at the remote site.

When setting up a standby circuit, follow these guidelines:

- Configure one side of the connection to initiate calls (the *hot standby* circuit). This is the outgoing side of the connection.
- Configure one side of the connection to receive calls (the *standby* circuit). This is the incoming side of the connection.

  If the standby circuit is part of a bandwidth-on-demand configuration, the outgoing side should be the *monitor* router, and the incoming side should be the *non-monitor* router.
- If you configure routing protocols on the standby circuit, the Inactivity Timeout parameter does not work. When the router brings up the standby circuit, the routing protocols keep the connection active.
- Configure the time of day schedules and the failback timers only on the hot standby side of the connection.
- Use CHAP or PAP as the authentication protocol for the circuit.
- If you want to use unnumbered interfaces, configure them on the outgoing hot standby circuit, and configure unnumbered demand circuit groups on the incoming standby circuit.

For more information about standby demand circuits, see Chapter 6, "Dial-on-Demand Implementation Notes."

Using the BCC

Configuring a Hot Standby Circuit

Hot standby circuits act as alternate paths for failed leased circuits. A leased circuit that uses a hot standby circuit is referred to as a *primary circuit.*

To configure a hot standby circuit, you assign a PPP demand circuit to a configured primary circuit using the **hot-standby** command. This command designates the demand circuit as a hot standby circuit.

To configure a hot standby circuit for a primary circuit, do the following:

1. Configure a primary circuit.

   Hot standby circuits can support the following types of primary circuits:

   - Single leased PPP circuit
   - Single leased Nortel Networks Standard circuit
   - PPP multilink circuit (Site Manager configurable only)
   - PPP multiline circuit (Site Manager configurable only)
   - Frame relay primary circuit with a direct mode PVC

2. Create a PPP demand circuit configuration that includes an IP circuit, user authentication information, and an outgoing phone number. In addition, ensure its **connection-mode** is set to the default, collision-master.

3. Navigate to the primary circuit prompt and enter:

   hot-standby *<demand_circuit_name>*

   demand_circuit_name is the name of the configured demand circuit.

   For example, to make the demand circuit to-dallas a hot standby circuit for the frame relay primary circuit centralbln, enter:

   `service/centralbln#` **hot-standby to-dallas**

   The demand circuit to-dallas is now a hot standby circuit. If the primary frame relay connection fails, the router activates the circuit to-dallas to continue the transmission of data.

4. Go to the next section, "Configuring a Normal Standby Circuit" to configure the other side of the standby connection.

Configuring a Normal Standby Circuit

For a router at the other end of a hot standby circuit to receive a call, you must configure the router with a normal standby demand circuit configuration that includes an IP circuit and caller resolution table.

To do this, navigate to the ppp demand circuit prompt and enter:

standby-mode *<mode>*

mode can be:

demand-normal	The circuit operates as a standard demand circuit. This is the default setting.
standby-normal	The circuit is a standby circuit for incoming calls. The router activates this type of standby circuit manually or by an incoming call.
standby-hot	The circuit will back up a failed primary circuit to continue the transmission of data. This is a read-only option; you cannot set it manually. The BCC automatically sets this value when you execute the command **hot-standby** <*demand_circuit_name*> for the primary circuit object.

For example, to make the demand circuit from-centralbln a normal standby circuit, enter:

```
ppp/from-centralbln# standby-mode standby-normal
```

In addition to creating a normal standby demand circuit, the circuit's connection-mode must be set to collision-slave, for example:

```
ppp/from-centralbln# connection-mode collision-slave
```

Controlling the Failback to the Primary Circuit

If you configured a demand circuit as a hot standby demand circuit, you can control the failback from the hot standby circuit back to the primary circuit.

To configure how the router transfers from using the hot standby circuit to the primary circuit, navigate to the ppp demand circuit prompt and enter:

standby-failback-mode *<failback_mode>*

failback_mode can be:

none	Instructs the router to rely exclusively on the circuit schedule parameters for primary and standby circuit operation and to ignore this parameter.
automatic	Automatically deactivates the hot standby circuit and sends data back across the primary circuit when it recovers. This option takes precedence over any configured circuit schedule.
manual	Controls the primary and hot standby circuits by operator intervention. To return traffic to the primary circuit, you manually deactivate the standby circuit. This option overrides the circuit's configured schedule.

For example, for the router to automatically transfer from the hot standby circuit to the primary, enter:

```
ppp/to-dallas# standby-failback-mode automatic
```

Controlling the Standby Circuit Manually

To manually activate or deactivate a standby circuit, navigate to the ppp circuit prompt and enter:

manual-standby-action *<action>*

action can be:

no-action - indicates that you do not want to manually activate a a normal or hot standby circuit.

activate - tells the router to activate a normal or hot standby circuit.

deactivate - tells the router to terminate a normal or hot standby circuit.

For example, to set the manual-standby-action parameter to active for the circuit to-dallas, enter:

```
ppp/to-dallas# manual-standby-action activate
```

Using Site Manager

To configure standby circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Standby Mode** • **Standby Failback Mode** • **Manual Standby Action** • **Standby Primary Circuit** Click on **Help** or see the parameter descriptions beginning on page A-41.	
6. Click on **Apply**, then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Enabling Callback

Callback is a feature for use between two peer routers, such as a central router and a remote router, over a PPP circuit. It lets you configure a router to call back an incoming caller. You cannot use callback with frame relay demand circuits or demand circuit groups.

Note the following guidelines:

- If the router is set to Server, Client, or Server Call ID, the router performs CHAP or PAP authentication when it receives a call.
- The one-charge modes ensure that only the server side of the callback connection incurs phone charges. When you choose any of these options, the server refuses the call from the client, eliminating charges for the client's initial call, but charging the server for its return calls to the client.
- To use any of the one-charge modes, each remote site must have a unique phone number. The server must be able to identify a single circuit for each phone number that it calls back.
- If you want to reduce your configuration work and you can purchase caller ID service, select the modes that use Call ID. These modes do not require an outgoing phone list to place a call; they rely only on the phone number in the call setup message.
- If you cannot use caller ID or the phone number in the call setup message is not sufficient to place an outgoing call (for example, you have to dial 9 to get an outside line), do not select a Call ID mode. For more information about callback, see Chapter 6, "Dial-on-Demand Implementation Notes."

Modifying the Callback Mode Parameter

If you modify the Callback Mode parameter, be aware of the following:

- The server or client delay time resets.

  If you change from a server mode to a client mode, or from a client mode to a server mode, the associated callback delay time resets to its default value.

  For example, if you change the callback mode from server to client, and the callback server delay Time was set to 5 seconds, this time resets to the default value of 0. Conversely, if you change the callback mode from client one charge to server one charge, the callback client delay time resets to its default value of 5 seconds.

- Site Manager prompts you to enable incoming call filtering.

  If you select server one charge or server one charge call ID, Site Manager prompts you to enable the Incoming Filter parameter. For these two callback modes, the router uses incoming call filtering to verify that the client is an authorized caller. If you later change these modes to any other callback mode, Site Manager prompts you to disable incoming call filtering.

- Site Manager requests caller resolution table information.

  If you select server, server call ID, client, or client one charge, Site Manager prompts you to make a caller resolution table entry by displaying the Caller Resolution Info window. These callback modes require a caller resolution table entry to authenticate callers on each side of the connection and, for the server, to indicate which circuit to activate for a call.

- Site Manager requests an outgoing phone number.

  If you select server or server one charge, and there are no entries in the outgoing phone list, Site Manager prompts you to enter a phone number by displaying the Outgoing Phone Number window.

Callback and the Circuit's Connection Mode

The server's callback configuration takes precedence over its connection mode. The Connection Mode parameter determines whether or not a router can place a call. If you enable callback, the router ignores the Connection Mode parameter to ensure that the server can always call the client.

The next two sections explain how to configure callback.

Using the BCC

To enable callback, navigate to the ppp circuit prompt and enter:

callback-mode *<mode>*

mode can be any of the values described in Table 12-1.

Table 12-1. Callback Mode Options

Mode	Meaning
inactive	Disables the callback feature for this circuit.
server	Designates the router as the callback server. The server receives a call from the client. It authenticates the caller, disconnects the call, and returns the call using a phone number in the outgoing phone list.
client	Designates the router as the callback client. Use this mode when the other end of the connection uses server or server call ID. The client initiates a call to the server, then waits for the server to return the call. When it receives the return call, the client authenticates the call before accepting it.
server-callid (ISDN connections only)	Designates the router as the callback server using caller ID. The server receives a call from the client, authenticates the call, and disconnects it. The server then returns the call using the phone number in the original call's setup message.
client-one-charge (ISDN connections only)	Designates the router as the callback client. Also indicates that there will be no charge for the initial call to the server. Use this mode when the other end of the connection uses server one charge or server once charge call ID. The client places a call to the server, expecting the call to fail. The server refuses the call, which eliminates any phone charge for the client. The client then waits for a return call from the server. This option saves the client the cost of the initial call.
server-one-charge (ISDN connections only)	Designates the router as the callback server. Also indicates that only the server will be charged for the return call to the client. The server receives a call from the client. The server, using incoming call filtering, verifies that the client is an authorized caller by matching the client's phone number with a phone number and circuit number in the incoming phone list. If the server finds a matching entry, it refuses the call. By refusing the call, the server eliminates any phone charges for the client. The server then returns the call using a phone number in its outgoing phone list for the matching circuit.
server-one-charge-callid (ISDN connections only)	Designates the router as the callback server using caller ID and indicates that only the server will be charged for the return call to the client. The server receives a call from the client. The server, using incoming call filtering, verifies that the client is an authorized caller by matching the client's phone number with a phone number and circuit number in the incoming phone list. If the server finds a matching entry, it refuses the call. By refusing the call, the server eliminates any phone charges for the client. The server then returns the call using the phone number in the original call's setup message.

For example, to set the callback mode to **client**, enter:

```
ppp/to-dallas# callback-mode client
```

Configuring Server and Client Delays

You can configure the server to delay the return call to allow time for the client's modem to disconnect or for its ISDN connection to stop retrying the original call. This option is available only if the **callback-mode** parameter is set to one of the server options.

To specify how long the server waits before calling back the client, navigate to the ppp circuit prompt and enter:

callback-server-delay <*integer*>

integer is a number from 0 to 1800 seconds. The default is 0.

If you are using a modem, enter a value greater than 6 seconds.

For example, to ensure that the server waits 15 seconds before calling the client back, enter:

```
ppp/to-dallas# callback-server-delay 15
```

You can configure the client to wait for a call from the server. During this time, the client will not place an outgoing call to any other destination. The delay gives the server time to return the initial call. This option is available only if the **callback-mode** parameter is set to one of the client options.

To specify how long the client waits for a return call from the server, navigate to the ppp circuit prompt and enter:

callback-client-delay <*integer*>

integer is a number from 0 to 1800 seconds. The default value is 5.

This value must be greater than the **callback-server-delay** setting. If you are dialing through a modem, enter a value greater than 45 seconds.

For example, to ensure that the router waits 50 seconds for the server to return the call, enter:

```
ppp/to-dallas# callback-client-delay 50
```

Using Site Manager

To enable the callback feature:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to modify.	
5. Set the following parameters: • **Callback Mode** • **Callback Server Delay Time (sec)** • **Callback Client Delay Time (sec)** Click on **Help** or see the parameter descriptions beginning on page A-43.	
6. Click on **Apply**, and then click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Choosing the Severity Level for Error Messages

Using the BCC, you can specify the severity level of debug messages that the router will collect in the event log. Debug messages contain information about demand circuit activity. The router collects these messages in an event log, which you can view to evaluate how the router is operating.

To assign the severity level, navigate to the demand-circuit prompt and enter:

debug-message-level <*severity_level*>

severity_level can be low, medium, high, or verbose.

You may want to try each setting to see which messages are entered in the log.

For example, to set the debug message severity level to medium, enter:

`demand-circuit/to-phoenix#` **debug-message-level medium**

Adding Bandwidth Service for Demand Lines (PPP Only)

If the demand line becomes congested, the router can provide an additional 29 dial-up lines to reduce the congestion by using lines from a bandwidth-on-demand pool. This feature is only available using Site Manager.

In Chapter 2, “Starting Dial Services Using Site Manager,” you could enable bandwidth-on-demand service for a demand circuit. See that chapter for instructions. To modify the bandwidth-on-demand parameters, see Chapter 14, “Customizing Bandwidth-on-Demand Circuits.”

Adding Layer 3 Protocols to PPP Demand Circuits

In Chapters 2 and 3, you added IP to a PPP demand circuit. To add other protocols, go to one of the next sections.

Using the BCC

To add layer 3 protocols to a PPP demand circuit, navigate to the ppp circuit prompt and enter the BCC protocol object name.

For example, to add IPX to the demand circuit, enter:

```
ppp/circuit-to-boston# ipx <network_address>
```

network_address can be any valid IPX 32-bit address.

For complete instructions on configuring IPX, see *Configuring IPX Services*.

Using Site Manager

To add layer 3 protocols to a PPP demand circuit

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Choose **Protocols**.*	The Protocols menu opens.
5. Choose **Add/Delete**.	The Select Protocols window opens.
6. Select one or more protocols for this demand circuit, then click on **OK**.	For each protocol, Site Manager displays windows that require configuration. See the appropriate protocol guide.
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

* If you enable compression across PPP demand circuits and configure the router to negotiate compression below the multilink bundle, do not configure protocol prioritization for demand circuits running PPP multilink. Protocol prioritization modifies the order in which packets are sent over the line, which could change the multilink-assigned order of packets and cause problems with the data. For more information about compression, see *Configuring Data Compression Services*.

Scheduling Demand Circuit Availability

After you complete the demand circuit's configuration, you can configure when the circuit is available.

You can define the following schedules (Table 12-2) using the BCC or Site Manager:

Table 12-2. Scheduling Options

Parameter	Function
days	Specifies the days that this circuit should be available. The router uses this parameter with a start time and end time that you specify to create a time period that the circuit can be available. The options are: sunday, monday, tuesday, wednesday, thursday, friday, saturday, weekday, and weekend. Individual days of the week take precedence over the weekday option.
start time	Specifies the time of day the demand circuit is available. The router uses a start time and end time to establish a time period when the circuit is available. This parameter also specifies the time of day any secondary lines are available if you configure bandwidth-on-demand service for a PPP demand circuit. For the router to activate the circuit at the configured start time, ensure that the Availability Mode parameter is set to the default, available. If you do not want the router to activate the circuit at the start time, set the Availability Mode to not available.
end time	Specifies the time of day the demand circuit is no longer available. The router uses this value with the start time to establish a time period when the circuit is available. This value also specifies the time of day that all secondary lines are deactivated if you set up bandwidth-on-demand service for a PPP demand circuit. For the router to deactivate the circuit at the configured end time, ensure that the Availability Mode parameter is set to the default, available. If you do not want the router to deactivate the circuit at the end time, set the Availability Mode to not available.
inactivity timer (BCC only)	If enabled, this timer instructs the router to disconnect the call if there is no data activity. Accept the default, disabled, if you want the router to establish the connection at the start time and remain active until the configured end time, regardless of data activity and regardless of the setting of the Availability Mode parameter. Only the network can bring down the connection.
availability mode	Determines whether the router activates the circuit between the configured time interval specified with the circuit's schedule.

Using the BCC

The following examples show how to set the BCC schedule parameters for the demand circuit.

To configure the object schedule, you must set the **days**, **start-time**, and **end-time** parameters. To set these parameters, navigate to the ppp or frame relay circuit prompt and enter:

schedule days <*day*> **start-time** <*time_of_day*> **end-time** <*time_of_day*>

day can be a specific day of the week, weekday, or weekend.

time_of_day is the time specified using the 24-hour system, 0 to 2400.

For example, to have an available circuit every day from 10 a.m. to 9 p.m. enter:

`ppp/to-boston#` **schedule days weekday start-time 1000 end-time 2100**

To enable the inactivity timer, enter:

inactivity-timer enabled

The default is disabled.

For example:

`schedule/to-boston/weekday/1000/2100#` **inactivity-timer enabled**

To set the availability mode, enter:

availability-mode <*mode*>

mode can be:

available	The circuit is available between the start time and end time.
not-available	The circuit is available during all hours outside the start time and end time interval defined by all schedules; there can be more than one schedule that defines a start time and end time interval.

For example:

`schedule/to-boston/weekday/1000/2100#` **availability-mode not-available**

Using Site Manager

To configure a circuit's schedule:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The the PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Click on **Schedule**.	The Circuit Time of Day Schedule window (PPP) or the Pool Availability window (frame relay) opens.
5. Click on **Add**.	The Circuit Time of Day Schedule window opens.
6. Set the following parameters: • **Days** • **Start Time** • **End Time** Click on **Help** or see the parameter descriptions beginning on page A-56.	
7. Click on **OK**.	You return to the Circuit Time of Day Schedule window or the Pool Availability window, which shows a schedule entry.
8. Set the following additional parameters: • **Inactivity Timeout** • **Availability Mode** Click on **Help** or see the parameter descriptions beginning on page A-59.	
9. Click on **Apply**, then click on **Done**.	You return to the appropriate demand circuits window.
10. Click on **Done**.	You return to the Demand Pools window.
11. Click on **Done**.	You return to the Configuration Manager window.

Scheduling PPP Standby Circuits

There are two scheduling parameters specific to PPP hot standby circuits. You can configure these using the BCC or Site Manager.

Using Schedules to Manage Standby Circuit Availability

Part of the standby circuit configuration is to schedule the circuit's availability. The time of day schedule defines the interval that the standby circuit is available. It also determines how the router uses the primary and standby circuits when they are both active.

You can configure several time of day schedules for a circuit in a 24-hour period. If you do not set up a schedule for the circuit, the circuit's availability defaults to 24 hours a day.

The Failback Time parameter is part of the time of day schedule. Depending on how you set this parameter, there may be a delay between the time the standby circuit is disconnected and the time traffic returns to the primary circuit. Therefore, it is important to balance the use of the primary and standby circuits to ensure that data reaches the remote destination.

Be aware that the router monitors the primary circuit during the failback time. If the primary circuit fails, the router continues to use the standby circuit.

Configuring Multiple Time of Day Schedules

Configuring multiple time of day schedules for a circuit can cause schedule conflicts. This section provides two examples of when this happens.

If the failback time for the active time of day schedule overlaps the failback time of the next schedule, the router uses the failback time of the latter schedule. The router deducts the amount of failback time already elapsed from the latter schedule (see "Example 1: Failback Times That Overlap").

Table 12-3 shows the time of day schedules for standby circuit 1.

Table 12-3. Time of Day Schedules for Standby Circuit 1

Time of Day Schedule 1	Time of Day Schedule 2	Time of Day Schedule 3
Start Time: 8 a.m. End Time: 11 a.m.	Start Time: 11 a.m. End Time: 5 p.m.	Start Time: 7 p.m. End Time: 11 p.m.
Failback Time: 60 minutes	Failback Time: 10 minutes	Failback Time: 10 minutes

Example 1: Failback Times That Overlap

7:00 a.m.	The primary circuit fails.
8:00 a.m.	The standby circuit becomes available.
10:30 a.m.	The primary circuit recovers and the failback timer starts counting down from 60 minutes. Data is still traveling over the standby circuit.
11:00 a.m.	Since 10:30 a.m., 30 minutes of failback time have elapsed for time of day schedule 1, but time of day schedule 2 is now active. This new schedule has a failback time of 10 minutes, which supersedes the previous failback time of 60 minutes. Because 10 minutes have passed, data traffic returns to the primary circuit.

If you schedule the standby circuit to terminate before the failback time expires, the router still terminates the standby circuit. The router does not wait for the primary circuit to recover. There is no circuit available until the primary circuit reactivates or the standby circuit is available again (see "Example 2: Failback Time Results in No Available Circuit").

Example 2: Failback Time Results in No Available Circuit

3:00 p.m.	The primary circuit fails and a standby circuit is activated, as specified in time of day Schedule 2.
4:55 p.m.	The primary circuit recovers. The failback timer starts counting down from 10 minutes.
5:00 p.m.	After 5 minutes, time of day schedule 3 is active. The standby circuit is brought down and will not be available until 7:00 p.m. For 5 minutes, there is no circuit available to transmit data.
5:05 p.m.	Data traffic transfers back to the primary circuit.

Using the BCC

If the **standby-failback-mode** is set to none, you can control when the router returns to the primary circuit by using a schedule for the standby circuit.

To control the return from the hot standby circuit to the primary circuit, navigate to the schedule prompt and enter:

schedule-standby-failback-mode <*mode*>

mode can be either automatic or manual.

Select automatic to automatically deactivate the hot standby circuit and return to the primary circuit. The **schedule-standby-failback-time** parameter for this circuit determines the failback delay. Select manual to manually deactivate the hot standby circuit.

For example, to rely on operator intervention to determine whether the active circuit becomes the primary again, enter:

```
schedule/to-boston/weekday/1000/2100# schedule-standby-failback-mode
manual
```

If the **standby-failback-mode** parameter is set to none, you can control how long the router waits before it deactivates the hot standby circuit and returns to a recovered primary circuit.

To configure the delay back to the primary circuit, navigate to the schedule prompt and enter:

schedule-standby-failback-time <*integer*>

integer is a number from 0 to 1439 minutes. The default is 0.

For example, to delay the return to the primary circuit for an hour, enter:

```
schedule/to-boston/weekday/1000/2100# schedule-standby-failback-time 60
```

Using Site Manager

To configure a standby circuit's schedule:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Click on **Schedule**.	The Circuit Time of Day Schedule window (PPP) or the Pool Availability window (frame relay) opens.
5. Set the following parameters: • **TimeOfDay Failback Mode** • **Failback Time (min.)** Click on **Help** or see the parameter descriptions beginning on page A-60.	
6. Click on **Apply**, then click on **Done**.	You return to the appropriate demand circuits window.
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Deleting a Schedule

You can delete a schedule for the router, as explained in the following sections.

Using the BCC

To delete a schedule for a specific demand circuit, navigate to the ppp or frame relay demand circuit schedule prompt and enter:

delete

For example, to delete the schedule for the demand circuit to Boston enter:

```
schedule/to-boston/weekend/0900/1700# delete
```

Using Site Manager

To delete a circuit's schedule:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Click on **Schedule**.	The Circuit Time of Day Schedule window (PPP) or the Pool Availability window (frame relay) opens.
5. Choose a schedule entry and click on **Delete**.	
6. Click on **Apply**, and then click on **Done**.	You return to the appropriate demand circuits window.
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Configuring Demand Circuit Groups

To simplify configuration of unnumbered interfaces in a large network, you can configure a demand circuit group. This feature is configurable only using Site Manager.

For more information about demand circuit groups, see “Demand Circuit Groups” on page 6-7.

To configure a demand circuit group:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuit Groups**.	The Demand Circuit Groups window opens.
3. Click on **Add Group**.	The Enter a Demand Pool window opens.
4. Set the following parameters: • **Pool ID** • **Number of Circuits** Click on **Help** or see the parameter descriptions beginning on page A-62.	
5. Click on **OK**.	The Caller Resolution Info window opens.
6. Go to “Caller Resolution Information for Demand Circuit Groups” on page 12-47.	

Protocol Configuration for Demand Circuit Groups

You must configure a demand circuit group using one of the following unnumbered protocols:

- IP with either RIP, RIP2, or OSPF as the routing protocol
- IPX with RIP, SAP, and/or NLSP as the routing protocol
- Bridging

Note: When you configure a protocol for a demand circuit group, Site Manager requires that you also configure a routing protocol.

A single protocol configuration applies to all circuits in the group and can be used by many remote nodes calling the recovery router.

Without the use of specific network addresses, the recovery router must use routing updates to determine the data path to the remote nodes. Unlike individual demand circuits, you can enable routing protocols for a demand circuit group without establishing a dial-up connection. The demand circuit group and its protocol interface are active only when the physical connection is active. Without a physical line available, no circuit or protocol information (for example, RIP update packets) can pass from one router to the next.

If you enable compression across PPP demand circuits and you configure the router to negotiate compression below the multilink bundle, do not configure protocol prioritization for demand circuits running PPP multilink. Protocol prioritization modifies the order in which packets are sent over the line, which could change the multilink-assigned order of packets and cause problems with the data. For more information about compression, see *Configuring Data Compression Services*.

Caller Resolution Information for Demand Circuit Groups

After you specify the demand pool ID and the number of circuits for a demand circuit group, Site Manager displays the Caller Resolution Info window. You use this window to enter the CHAP name or PAP ID of the remote routers associated with this demand circuit group. When a remote call comes in, the router activates a circuit from the specified circuit group.

Site Manager prompts you for this information because demand circuit groups cannot initiate calls. Site Manager ensures that you make an entry for the remote router in the caller resolution table so that the local router, configured with the demand circuit group, can accept incoming calls.

To complete the Caller Resolution Info window:

Site Manager Procedure	
You do this	**System responds**
1. Set the following parameters: • **Caller Name** • **CHAP Secret** • **PAP Password** Click on **Help** or see the parameter descriptions beginning on page A-65. You can make additional entries in the caller resolution table. See Chapter 16, “Customizing Caller Resolution” for instructions.	
2. Click on **OK**.	You return to the Demand Circuit Groups window, which shows the new demand circuit group and its demand pool.
3. Enable the unnumbered protocols that you want for this demand circuit group. See the parameter descriptions beginning on page A-63.	
4. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Demand Circuit Group Configuration

To modify the demand circuit group configuration:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuit Groups**.	The Demand Circuit Groups window opens.
3. Select a demand circuit group to modify.	
4. To change the protocol that the circuit group uses, disable the current protocol and enable another one; then click on **Apply**. For parameter descriptions for each protocol, see page A-63.	
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Number of Circuits in a Demand Circuit Group

To modify the number of circuits in a demand circuit group:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuit Groups**.	The Demand Circuit Groups window opens.
3. Click on **Edit Pools**.	The Demand Circuit Group window opens.
4. Set the **Number of Circuits** parameter. Click on **Help** or see the parameter description on page A-63.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Click on **Done**.	You return to the Demand Circuit Groups window.
6. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Demand Pool That the Demand Circuit Group Uses

To modify the demand pool used by the demand circuit group:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuit Groups**.	The Demand Circuit Groups window opens.
3. Click on **Edit Pools**.	The Demand Circuit Group window opens.
4. Click on **Add Group.**	The Enter a Demand Pool window opens.
5. Set the following parameters: • **Pool ID** • **Number of Circuits** Click on **Help** or see the parameter descriptions beginning on page A-62.	
6. Click on **OK**.	You return to the Demand Circuit Group window.
7. Click on **Done**.	You return to the Configuration Manager window.

Removing a Demand Circuit Group

To remove a demand circuit group:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuit Groups**.	The Demand Circuit Groups window opens.
3. Click on **Edit Pools**.	The Demand Circuit Group window opens.
4. Select the demand circuit group that you want to remove.	
5. Click on **Delete**.	Site Manager removes the demand circuit group.
6. Click on **Done**.	You return to the Demand Circuit Groups window.
7. Click on **Done**.	You return to the Configuration Manager window.

Removing Demand Circuits

You can delete any demand circuit using either the BCC or Site Manager.

Using the BCC

To delete a PPP or frame relay demand circuit, navigate to the demand circuit prompt and enter:

delete

For example:

```
demand-circuit/to-boston# delete
```

When you delete a demand circuit, you delete all related objects.

Using Site Manager

To remove a demand circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits** or **FR Circuits**.	The PPP Demand Circuits window or the FR Demand Circuits window opens.
4. Select the circuit that you want to remove.	
5. Click on **Delete**.	Site Manager removes the circuit.
6. Click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Deleting Hot Standby Circuits

To delete a hot standby circuit, first delete the hot standby object associated with the primary circuit, then delete the demand circuit.

To delete the hot standby object, navigate to the hot-standby prompt, which is one level under the primary circuit context, and enter:

delete

For example:

```
hot-standby/to-dallas# delete
```

Next, navigate to the demand circuit prompt and delete the demand circuit.

For example:

```
demand-circuit/to-dallas# delete
```

Chapter 13
Customizing Backup Circuits

The router activates a backup circuit when a leased circuit fails. To configure backup service, you designate a leased circuit as a *primary circuit.* This designation tells the router to activate a backup circuit if the leased circuit fails. If you have not configured a leased circuit, you cannot configure a backup circuit.

For PPP configurations only, you should have set up a backup pool according to the instructions in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC,” and added PPP backup circuits.

This chapter includes the following information:

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For a complete description of frame relay and PPP backup service, see Chapter 1, “Dial Services Overview.”

Table 13-1 lists the instructions you should use to configure backup circuits.

Table 13-1. Dial Backup Configurations

Primary Circuit Protocol	Backup Circuit Protocol	Refer to this section for configuration instructions
Standard	PPP (async or sync)	"Creating PPP Dial Backup Circuits" on page 2-19 (Site Manager) "Configuring PPP Backup Circuits" on page 3-19 (BCC)
PPP	PPP (async or sync)	
Frame relay backing up only one PVC (*circuit backup*)	PPP (async or sync)	"Creating a PPP Backup Circuit for a Direct Mode PVC" on page 13-2
Frame relay backing up the entire interface (*link backup*) Site Manager configurable only.	frame relay	"Creating Frame Relay Backup Circuits for Group Mode PVCs" on page 13-5

You cannot configure a bandwidth-on-demand circuit as a primary circuit.

Creating a PPP Backup Circuit for a Direct Mode PVC

If your frame relay circuit is configured as a direct mode PVC, that is, there is only one PVC in the service record, you must configure PPP for the backup circuit. This is called *circuit backup*.

Using the BCC

To configure a PPP backup circuit for a frame relay PVC:

1. **Configure a frame relay leased interface.**

   For example, to create a frame relay interface on a synchronous interface on slot 5 connector 1 and configure a service record, navigate to the serial prompt and enter:

   `serial/5/1#` **frame-relay; service to-Boston; pvc 100**

   To create a frame relay interface on an MCT1 connector, navigate to the logical line entry for the MCT1 interface and enter:

   `logical-line/to-Boston#` **frame-relay; service to-Boston; pvc 100**

2. **Create a dial object to be used by dial backup service.**

   For example, to make the interface on slot 2 connector 1 a backup interface, navigate to the box prompt and enter:

   ```
   box# serial/2/1
   serial/2/1# dial
   ```

   By entering **dial**, PPP automatically becomes the default data link protocol.

3. **Create a backup pool.**

   For example:

   ```
   box# backup-pool 10
   ```

4. **Add a backup line to the pool, then return to the frame relay leased interface prompt.**

   For example:

   ```
   backup-pool/10# backup-line serial/2/1
   backup-line/2/1# box; serial 5/1; frame-relay; service/to-Boston
   ```

5. **Create a backup circuit.**

   backup-circuit pool-id *<ID_number>* **backup-mode** *<mode>*

   ID_number is the number of a line pool.

   mode can be:

   initiator - instructs the router to initiate dialing. The router at the other end must be set to receiver so that it waits until the initiator router makes the call. Only one router on the link can serve as the initiator. If both are set to initiator, they may try to initiate a call simultaneously, resulting in a collision.

   receiver - instructs the router to wait to receive the call from the initiator. If you configure the router to be the receiver, you need to make a caller resolution entry for the circuit. By requiring an entry, the local router can then verify the initiator's identity and accept the incoming calls.

   For example, to provide dial backup service for a frame relay primary circuit on slot 5 connector 1, using line pool 10, enter:

   ```
   service/to-Boston# backup-circuit pool-id 10 backup-mode initiator
   ```

   Adding a backup circuit for this interface makes the frame relay leased interface a primary interface and enables dial backup service.

For more information about using the BCC to configure frame relay, see *Configuring Frame Relay Services*.

Using Site Manager

To configure a PPP backup circuit for a frame relay PVC:

Site Manager Procedure	
You do this	**System responds**
1. Configure a frame relay leased interface with a service record containing one PVC. You need to add a new service record to the frame relay interface. When you add a service record, it automatically has only one PVC, which requires a DLCI number. For instructions, see *Configuring Frame Relay Services*.	
2. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
3. Choose **Backup Circuits**.	The Backup Circuits menu opens.
4. Choose **PPP**.	The Primary Circuit Definition window opens, listing the frame relay PVC.
5. Select the frame relay circuit and click on **Cct Type**.	The Circuit Options window opens.
6. Set the **Circuit Type** parameter to **Primary**. Click on **Help** or see the parameter description on page A-78.	
7. Set the **Backup Pool ID** parameter. Click on **Help** or see the parameter description on page A-68.	
8. Click on **OK**.	You return to the completed Primary Circuit Definition window.
9. Repeat steps 5 through 8 for each primary circuit that you want to add.	
10. Click on **Done**.	You return to the Configuration Manager window.

Creating Frame Relay Backup Circuits for Group Mode PVCs

If your frame relay interface has group mode PVCs, that is, a service record with multiple PVCs, you need to back up the entire interface. This is called *link backup*. For link backup, you must configure frame relay across the backup circuit. You cannot use link and circuit backup over the same frame relay interface.

You can configure link backup using Site Manager only.

To configure a frame relay backup circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay**.	The FR Primary Interface Definition window opens.
4. Click on **Intf. Type**.	The FR Interface window opens.
5. Set the **Interface Type** parameter to **Primary/Shared** or **Primary/Secondary**. Click on **Help** or see the parameter description on page A-72.	If you select Primary/Secondary, Site Manager prompts you to enable the frame relay interface. You will do this in step 8.
6. Set the **Pool ID** parameter and click on **OK**. Click on **Help** or see the parameter description on page A-73.	You return to the FR Primary Interface Definition window, which has four new buttons: Backup Def., Schedule, Phone Out, and Apply.
7. If you selected Primary/Secondary as the interface type, click on **Backup Def**.	The FR Backup Interface window opens.
8. Set the **FR Service Control** parameter to **Enable**. Click on **Help** or see the parameter description on page A-76.	
9. Click on **Done**.	You return to the FR Primary Interface Definition window.
10. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Frame Relay Backup Interface

After you configure a primary circuit, Site Manager sets up the frame relay backup circuit with default values. The interface parameters define the frame relay characteristics of the circuit, unlike the primary interface parameters, which define the behavior of the backup circuit.

To modify the frame relay backup interface:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay**.	The FR Primary Interface Definition window opens.
4. Click on **Backup Def**.	The FR Backup Interface window opens.
5. Optionally, set the following parameters: • **Mgmnt Type** • **Address Type** • **Address Length** • **Polling Interval** • **Full Enquiry Interval** • **Error Threshold** • **Monitored Events** • **Multicast** • **Congestion Control** • **Congestion Timer** • **Congestion Counter** • **Hangup on DLCMI Failure** Click on **Help** or see *Configuring Frame Relay Services* for parameter descriptions.	
6. Click on **Done**.	You return to the FR Primary Interface Definition window.
7. Click on **Done**.	You return to the Configuration Manager window.

Modifying Frame Relay Service Records

A frame relay service record is a data structure that allows flexible grouping and characterization of PVCs. Each record can contain one or more PVCs. The router creates the first service record automatically when you select frame relay as the WAN protocol. This is the *default service record*. If a PVC is not included in a configured service record, it uses the default service record.

To modify the default service record or add service records:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay**.	The FR Primary Interface Definition window opens.
4. Click on **Backup Def**.	The FR Backup Interface window opens.
5. Click on **Services**.	The Frame Relay Backup Service List window opens. The router supplies the service name in the Service Name parameter.
6. Modify the **Service Name** parameter only if you are sure the new name is unique for the router. Click on **Help** or see *Configuring Frame Relay Services* for the parameter description.	
7. Optionally, click on **PVCs** to configure PVCs for the service record; otherwise, go to step 11.	The Frame Relay Backup PVC List window opens.
8. Click on **Add** to add a PVC to the service record.	The Frame Relay PVC Add window opens.
9. Set the **DLCI Number** parameter then click on **OK**. Click on **Help** or see *Configuring Frame Relay Services* for the parameter description.	You return to the Frame Relay Backup PVC List window.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
10. Optionally, set the following parameters: • **Circuit State Set** • **Multicast** • **Hybrid Mode** • **Congestion Control** • **Congestion Timer** • **Congestion Counter** • **Compression Control** For parameter descriptions and more information about frame relay service records and PVCs, see *Configuring Frame Relay Services*.	
11. Click on **Done**.	You return to the Frame Relay Backup Service List window.
12. Click on **Done**.	You return to the FR Backup Interface window.
13. Click on **Done**.	You return to the FR Primary Interface Definition window.
14. Click on **Done**.	You return to the Configuration Manager window.

Configuring Filters for Backup Configurations

To prevent unwanted traffic across a frame relay interface, you can define protocol priorities to ensure the arrival of critical data, and set up outbound filters to handle unwanted data.

Configuring Filters for Primary/Secondary Interfaces

To configure filters for primary/secondary interfaces:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Protocols**.	The Protocols menu opens.
2. Choose **Edit Protocol Priority**.	The Priority/Outbound Filters window opens.
3. Create, enable, and modify traffic filters. See *Configuring Traffic Filters and Protocol Prioritization* for detailed instructions.	
4. Click on **Done**.	You return to the Configuration Manager window.

Configuring Filters for Primary/Shared Interfaces

To configure filters for primary/shared interfaces:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay**.	The FR Primary Interface Definition window opens.
4. Click on **Backup Def**.	The FR Backup Interface window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Click on **Filters**.	The Priority/Outbound Filters window opens.
6. Create, enable, and modify traffic filters. See *Configuring Traffic Filters and Protocol Prioritization* for detailed instructions. If you do not configure filters for a primary/shared interface, the interface uses the primary circuit's filters.	
7. Click on **Done**.	You return to the FR Backup Interface window.
8. Click on **Done**.	You return to the FR Primary Interface Definition window.
9. Click on **Done**.	You return to the Configuration Manager window.

Customizing PPP and Frame Relay Backup Circuits

You can modify the configuration of the backup circuits.

Modifying Which Router Initiates a Call

For PPP backup circuits, you can specify which router can initiate a dial backup connection by configuring the backup mode.

Using the BCC

You must specify the backup mode when you initially configure a backup circuit. To change the backup mode, delete the backup circuit and re-create it with a different mode. For instructions, see "Configuring PPP Backup Circuits" on page 3-19.

Using Site Manager

To edit the backup mode, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuit**s.	The Backup Circuits menu opens.
3. Choose **PPP**.	The Primary Circuit Definition window opens.
4. Select the **Backup Mode** parameter. Click on **Help** or see the parameter description on page A-70.	
5. Click on **Done**.	You return to the Configuration Manager window.

Modifying PPP Authentication Information

To configure PPP authentication, you can use CHAP or PAP. You configured CHAP authentication, the default authentication protocol, in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3 “Starting Dial Services Using the BCC.”

For more information about CHAP and PAP, see Chapter 5, “Implementation Notes for All Dial Services.”

Using the BCC

Changing the Authentication Protocol

CHAP is the default authentication protocol. To change the authentication protocol that the router uses, navigate to the dial prompt and enter:

authentication-protocol <*protocol*>

protocol can be pap, chap, or none.

For example, to switch from the default protocol to PAP, enter:

```
dial/serial/1/1# authentication-protocol pap
```

Configuring CHAP

If you configure CHAP as the authentication protocol, you must configure a CHAP name and secret.

The CHAP name is part of the outbound call and informs remote peer routers of the local router's identity. The CHAP secret is for identification and security purposes, and must be the same on both sides of the link.

To configure CHAP, navigate to the backup-circuit prompt and enter:

chap-name <*text-string*> **chap-secret** <*text-string*>

text-string can be any text string up to 20 characters.

For example, for the backup circuit supporting primary line 5/1, enter:

```
backup-circuit/10/5/1# chap-name bayrs1 chap-secret east
```

Note that each circuit must have a unique CHAP name.

Configuring PAP

If you configure PAP as the authentication protocol, you must configure a PAP ID and PAP password. The PAP ID identifies the calling router to the called router. During the authentication phase, all password authenticate-request messages that the calling router sends to the called router must include the correct PAP ID and password or the connection will not be successful.

To configure PAP, navigate to the backup-circuit prompt and enter:

pap-id <*text-string*> **pap-password** <*text-string*>

text-string can be any text string up to 25 characters.

For example, for the backup circuit supporting primary line 5/1, enter:

```
backup-circuit/10/5/1# pap-id bayrs pap-password admin
```

Configuring Outbound Authentication

Outbound authentication specifies whether the router performs authentication when it places an outbound call. Disabling outbound authentication improves interoperability with devices that do not perform two-way authentication or support CHAP.

Accept the default, enabled, if you want to use two-way authentication, that is, if each side of the connection will authenticate the other's identity. Select disabled to use one-way authentication, which means that only the router receiving the call performs authentication.

If you disable this parameter to use one-way authentication, you must enable the PPP Fallback parameter, which is part of the PPP interface configuration. For information about the PPP Fallback parameter, see *Configuring PPP Services.*

To specify whether the router performs authentication when it places an outbound call, navigate to the backup-circuit prompt and enter:

outbound-authentication <*state*>

state is enabled or disabled.

For example, for the backup circuit supporting primary line 5/1, enter:

`backup-circuit/10/5/1#` **outbound-authentication disabled**

Using Site Manager

To modify the authentication parameters, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuit**s.	The Backup Circuits menu opens.
3. Choose **PPP**.	The Primary Circuit Definition window opens.
4. Select the circuit that you want to modify.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Set the following parameters: • **CHAP Local Name** • **CHAP Secret** • **PAP Local ID** • **PAP Password** • **Outbound Authentication** Click on **Help** or see the parameter descriptions beginning on page A-46.	
6. Click on **Done**.	You return to the Configuration Manager window.

To change the authentication protocol from the default CHAP to PAP, you need to access a PPP configuration window. To select PAP, you must open the PPP Interface List window, select the line record for dial lines, and specify PAP for the Local Authentication Protocol parameter. For more information about PPP and configuring authentication protocols, see *Configuring PPP Services*.

Customizing the Duration of the Circuit

You can specify how long the connection is active.

Using the BCC

The **max-uptime** parameter specifies the maximum duration of a call for a continuous period of time. This ensures that the connection is not up longer than necessary.

For example, configure the circuit's availability from 9:00 a.m. to 5:00 p.m. Then configure this parameter for 60 minutes. If the connection comes up at 10:00 a.m., the router keeps the circuit active until 11:00 a.m.

To specify the maximum amount of time that the circuit is active, in minutes, navigate to the backup-circuit prompt and enter:

max-uptime <*integer*>

integer is a number from 1 to 999,999. The default is 60 minutes.

For example:

```
backup-circuit/10/5/1# max-uptime 100
```

Using Site Manager

To specify the duration of the backup circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP** or **Frame Relay.**	The Primary Circuit Definition window or the FR Primary Interface Definition window opens.
4. Set the following parameters: • **Maximum Up Time** • **Max UpTime Termination** • **UpTime Term. Reset** Click on **Help** or see the parameter descriptions beginning on page A-51.	
5. Click on **Apply**, then click on **Done**.	You return to the Configuration Manager window.

Modifying the Activation of a Backup Circuit

The primary down time determines how long the router waits before activating a backup circuit. This delay ensures that the primary has enough time to recover from any minor failure.

Using the BCC

To set the primary down time parameter, navigate to the backup-circuit prompt and enter:

primary-down-time <*integer*>

integer is any number of minutes. The default is 5 minutes.

For example:

```
backup-circuit/10/5/1# primary-down-time 10
```

Using Site Manager

The primary down time is found on the FR Primary Interface window. To specify the primary down time, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay.**	The FR Primary Interface Definition window opens.
4. Set the **Primary Down Time** parameter. Click on **Help** or see the parameter description on page A-75.	
5. Click on **Done**.	You return to the Configuration Manager window.

Enabling Filters for Backup Circuits (Frame Relay Only)

Using Site Manager, you can enable the use of filters across the backup circuits to prevent unwanted data from keeping the backup circuit active.

To enable filters for the backup circuit, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **Frame Relay.**	The FR Primary Interface Definition window opens.

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Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Set the **Use Backup Interface Filters** parameter. Click on **Help** or see the parameter description on page A-75.	
5. Click on **Done**.	You return to the Configuration Manager window.

Specifying the Redial Count

Using the BCC, you can specify the number of times that the router redials the phone number to activate the backup circuit.

To configure the number of redials, navigate to the backup-circuit prompt and enter:

redial-count <*integer*>

integer is a value from 1 to 10. The default is 3.

For example:

```
backup-circuit/10/5/1# redial-count 5
```

Specifying the Time Between Calls

Using the BCC, you can specify the amount of time, in seconds, that the router waits between call retries.

To configure the time between calls, navigate to the backup-circuit prompt and enter:

redial-delay <*integer*>

integer is a value from 1 to 60. The default is 3.

For example:

```
backup-circuit/10/5/1# redial-delay 30
```

Choosing the Severity Level for Error Messages

Using the BCC, you can specify the severity level of debug messages that the router collects in the event log regarding backup circuit activity.

To assign the debug message level, navigate to the backup-circuit prompt and enter:

debug-message-level <*severity_level*>

severity_level can be low, medium, high, or verbose.

For example:

```
backup-circuit//10/5/1# debug-message-level medium
```

Scheduling Backup Circuit Availability

After you complete the backup circuit configuration, you can schedule when the backup circuit is available for the primary circuit.

You can define the following schedules using the BCC or Site Manager (Table 13-2).

Table 13-2. Scheduling Options

Parameter	Function
days	Specifies the days that this circuit should be available. The router uses this parameter together with a start time and end time that you specify to create a time period that the circuit can be available. The options are: sunday, monday, tuesday, wednesday, thursday, friday, saturday, weekday, or weekend. Individual days of the week take precedence over the weekday option.
start time	Specifies the time of day the backup circuit is available. The router uses this parameter and the End Time parameter to establish a time period when the circuit is available. For the router to activate the circuit at the configured start time, ensure that the Availability Mode parameter is set to the default, available. If you do not want the router to activate the circuit at the start time, set the Availability Mode to not available.

(continued)

Table 13-2. Scheduling Options *(continued)*

Parameter	Function
end time	Specifies the time of day the backup circuit is no longer available. The router uses this parameter and the Start Time parameter to establish a time period when the circuit is available. For the router to deactivate the circuit at the configured end time, ensure that the Availability Mode parameter is set to the default, available. If you do not want the router to deactivate the circuit at the end time, set Availability Mode to not available.
inactivity timer (BCC only)	If enabled, this timer instructs the router to disconnect the call if there is no data activity. Accept the default, disabled, if you want the router to establish the connection at the start time and remain active until the configured end time, regardless of data activity and regardless of the setting of the Availability Mode parameter. Only the network can bring down the connection.
availability mode	Determines whether the router activates the circuit between the configured time interval specified with the circuit's schedule.

Using the BCC

The following examples show how to set the BCC schedule commands for the backup circuit.

To configure the object schedule, you are required to set the days, start-time, and end-time parameters. To set these parameters, navigate to the backup-circuit prompt and enter:

schedule days <*day*> **start-time** <*time_of_day*> **end-time** <*time_of_day*>

day can be a specific day of the week, weekday, or weekend.

time_of_day is the time specified using the 24-hour clock, 0 to 2400.

For example:

```
backup-circuit/8/1# schedule days weekday start-time 1000 end-time 2100
```

To set the inactivity timer, enter:

inactivity-timer <*state*>

state is enabled or disabled.

For example:

`schedule/backup/8/1/weekday/1000/2100#` **inactivity-timer enabled**

To set the availability mode, enter:

availability-mode <*mode*>

mode can be:

available	The circuit is available between the start time and end time.
not-available	The circuit is available during all hours outside the start time and end time interval defined by all schedules; there can be more than one schedule that defines a start time and end time interval.

For example:

`schedule/backup/8/1/weekday/1000/2100#` **availability-mode outside-interval**

Using Site Manager

To specify a schedule for the backup circuit:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP** or **Frame Relay**.	The Primary Circuit Definition window or the FR Primary Interface Definition window opens.
4. Click on **Schedule**.	The first Circuit Time of Day Schedule window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Click on **Add**.	The second Circuit Time of Day Schedule window opens.
6. Set the following parameters: • **Days** • **Start Time** • **End Time** • **Availability Mode** Click on **Help** or see the parameter descriptions beginning on page A-56.	
7. Click on **OK**.	You return to the completed Circuit Time of Day Schedule window.
8. You can revise the schedule by changing the parameters values and clicking on **Apply**.	
9. Click on **Done**.	You return to the Primary Circuit Definition or the FR Primary Interface Definition window.
10. Click on **Done**.	You return to the Configuration Manager window.

Deleting a Backup Circuit Schedule

The following sections explain how to delete a schedule that you configured for a backup circuit.

Using the BCC

To delete a backup circuit's schedule, navigate to the schedule prompt and enter:

delete

For example:

```
schedule/backup/8/1/weekday/1000/2100# delete
```

Using Site Manager

To delete a backup circuit's schedule:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP** or **Frame Relay**.	The Primary Circuit Definition window or the FR Primary Interface Definition window opens.
4. Click on **Schedule**.	The first Circuit Time of Day Schedule window opens.
5. Select a schedule entry to be deleted.	
6. Click on **Delete**.	Site Manager removes the entry.
7. Click on **OK**.	You return to the completed Circuit Time of Day Schedule window.
8. Click on **Done**.	You return to the Primary Circuit Definition or the FR Primary Interface Definition window.
9. Click on **Done**.	You return to the Configuration Manager window.

Removing PPP or Frame Relay Backup Service

The following sections explain how to remove dial backup circuits.

Using the BCC

To delete a backup service, navigate to the backup-circuit prompt for the interface that you want to delete and enter:

delete

For example:

```
backup-circuit/8/5/1# delete
```

Using Site Manager

To remove backup service:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP** or **Frame Relay**.	The Primary Circuit Definition window or the FR Primary Interface Definition window opens.
4. Click on **Cct Type** or **Intf. Type**.	The Circuit Options window or the FR Interface window opens.
5. Modify one of the following parameters: • For PPP, change the **Circuit Type** parameter to **Normal**. Click on **Help** or see the parameter description on page A-67. • For frame relay, change the **Interface Type** parameter to **Normal**. Click on **Help** or see the parameter description on page A-72.	Site Manager asks you to confirm the change, and then removes the backup circuit and treats the leased circuit as a regular circuit.
6. Click on **OK**.	You return to the Circuit Options or the FR Interface window.
7. Click on **Done**.	You return to the Configuration Manager window.

Chapter 14
Customizing Bandwidth-on-Demand Circuits

This chapter includes the following information:

Topic	Page
Customizing Bandwidth-on-Demand Service	14-2
Changing the Authentication Protocol	14-3
Monitoring Congestion on the Bandwidth or Demand Circuit	14-3
Enabling BAP for Bandwidth-on-Demand Service	14-8
Removing Bandwidth-on-Demand Service	14-9

To enable bandwidth-on-demand service, you can do the following:

- Designate a single leased circuit or leased multilink circuit as a bandwidth-on-demand circuit.
- Associate a dial-on-demand circuit with a bandwidth-on-demand pool.

If any of these circuits becomes congested, the router provides up to 29 additional dial-up circuits to relieve congestion, for a total of 30 circuits. You should have already set up a bandwidth-on-demand pool and circuit in Chapter 2, “Starting Dial Services Using Site Manager.”

Table 14-1 lists the terminology that Site Manager and this guide use to describe circuits in a bandwidth-on-demand configuration.

Table 14-1. Terminology for Bandwidth-on-Demand Service

Type of Circuit	Referred to As
Leased circuit Leased multilink circuit	Bandwidth circuit You designate a leased circuit as a bandwidth circuit to enable bandwidth-on-demand service.
Dial-on-demand circuit	Demand circuit This is a demand circuit for which you can provide bandwidth-on-demand service. You do not designate this as a bandwidth circuit.
Dial-up circuit that helps the congested leased circuit	Dial-up or secondary circuit

Customizing Bandwidth-on-Demand Service

After bandwidth-on-demand service is set up, Site Manager adds three new buttons to the Bandwidth-On-Demand Circuit Definition window (Apply, Phone Out, and Options). You can use these buttons to modify the parameter defaults.

To modify the configuration:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens.
3. Select an existing circuit or add a new circuit, and then enter new values for the parameters according to the descriptions in Appendix A.	
4. Click on **Apply**, and then click on **Done**.	You return to the Configuration Manager window.

Table 14-2 lists ways to modify your bandwidth-on-demand configuration.

Table 14-2. Customizing Bandwidth-on-Demand Service

Task	Site Manager Parameter	Page
Add bandwidth circuits.	Circuit Type Bandwidth-On-Demand Pool ID	A-78 A-78
Determine which router monitors congestion.	Bandwidth Mode	A-79
Modify the authentication information.	CHAP Local Name CHAP Secret PAP Local ID PAP Password Outbound Authentication	A-46 A-47 A-48 A-49 A-50

Changing the Authentication Protocol

CHAP is the default authentication protocol. To select PAP, you must specify PAP for the Local Authentication Protocol parameter. For instructions, see *Configuring PPP Services*.

Monitoring Congestion on the Bandwidth or Demand Circuit

To relieve congestion across the leased bandwidth or demand circuit, a router on one side of the connection must monitor the traffic level on the circuit.

The Bandwidth Mode parameter in the Circuit Options window specifies which router monitors congestion. The default for this parameter is Non-Monitor. Changing the value to Monitor makes your router the congestion monitor. You can then modify the congestion monitor parameters, which determine when the router activates additional lines to relieve congestion.

Although Site Manager provides default values for the monitor parameters, edit them for your network applications. If the network is critical to your operations and you want to ensure expedient data transmission, customize your threshold values so that even with moderate congestion, the router activates additional lines. Remember to account for data compression, which will also relieve congestion over a line. Also, the cost of additional lines may determine how often you want the router to activate the lines.

Bandwidth-on-Demand Congestion Monitor Parameters

For BayRS 12.10 or later, when WCP is negotiated above the multilink bundle and the router sends or receives data, it calculates the congestion thresholds based on compressed data. If WCP is negotiated below the multilink bundle, the router calculates these thresholds based on uncompressed data.

If a router using BayRS Version 12.10 software is communicating with a router using software prior to Version 12.10, the routers must negotiate WCP below the bundle, so the thresholds will be based on uncompressed data.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens.
3. Click on **Options**.	The Bandwidth-On-Demand Monitor Options window opens.
4. Set the **Bandwidth-on-Demand Pool ID** parameter. Click on **Help** or see the parameter description on page A-83.	
5. Verify that the **PPP Circuit Mode** parameter is set to **Multilink Monitor**. Click on **Help** or see the parameter description on page A-83. If you selected Monitor for the bandwidth mode when you configured a bandwidth circuit in Chapter 2, Site Manager sets the **PPP Circuit Mode** parameter accordingly.	
6. For the remaining parameters in the window, accept the defaults or modify the parameters according to the descriptions in Appendix A.	
7. Click on **OK**.	You return to the Bandwidth-On-Demand Circuit Definition window.
8. Click on **Done**.	You return to the Configuration Manager window.

Table 14-3 explains how to change the monitor parameters.

Table 14-3. Changing the Monitor Parameters

Task	Site Manager Parameter	Page
Specify how often the router checks for congestion.	BOD Exam Period	A-84
Specify a percentage of the maximum amount of data that can be transmitted across the line.	BOD Full Threshold	A-84
Indicate the number of consecutive times the line exceeds the BOD Full Threshold and is considered congested.	BOD Periods to Fail	A-85
Instruct the router which slots to use to activate additional lines (for BAP and non-BAP bandwidth-on-demand service).	Preferred Bandwidth Slot Reserved Bandwidth Slot	A-85 A-86
Specify the maximum number of links in a multilink bundle.	Maximum Links	A-86
Specify a percentage that the data traffic must be reduced before the line is no longer considered congested.	BOD Recovery Threshold	A-87
Specify the number of consecutive times the line falls below the BOD Recovery Threshold and is not considered congested.	BOD Periods to Recover	A-87

Setting the Preferred and Reserved Slots

Table 14-3 explains how to change the monitor parameters from the Bandwidth On Demand Monitor Options window. You can also edit these parameters from the Bandwidth-On-Demand Pools window, as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Pools**.	The Bandwidth-On-Demand Pools window opens.
3. Click on **Priority**.	The Preferred/Reserved Slots for BOD Pool window opens.
4. Set the following parameters: • **Preferred Bandwidth Slot** • **Reserved Bandwidth Slot** Click on **Help** or see the parameter descriptions beginning on page A-85.	The slot parameters that you specify affect all circuits in the pool. Also, Site Manager applies these values to the same parameter in the Bandwidth On Demand Monitor Options window. If you change the lines in a bandwidth pool, and the Bandwidth Mode parameter for these lines is set to Monitor, Site Manager prompts you to enter new values for the Preferred and Reserved Bandwidth Slot parameters.
5. Click on **OK**.	You return to the Bandwidth-On-Demand Pools window.
6. Click on **Done**.	You return to the Configuration Manager window.

Setting the Preferred and Reserved Slots for BAP

If you configure BAP for dial-up circuits, the Bandwidth Mode parameter must be set to Dynamic Monitor. This enables the router to act as the monitor or non-monitor router. You must then configure the Preferred and Reserved Bandwidth Slot parameters so that the non-monitor router knows which slots to check first for available lines. The non-monitor router then sends the monitor router the phone number that it dials to activate the additional line.

Modifying Multilink Fragmentation

Multilink fragmentation lets the router break up data packets into smaller segments for efficient data transfer across multilink circuits. Fragmentation is enabled by default.

To modify the size of fragmentation packets or disable fragmentation:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens.
3. Click on **Options**.	The Bandwidth-On-Demand Monitor Options window opens.
4. Set the **Fragmentation Trigger Size** parameter. Click on **Help** or see the parameter description on page A-88.	
5. To disable fragmentation, set the **Multilink Fragmentation** parameter to **Prohibited**. Click on **Help** or see the parameter description on page A-88.	
6. Click on **OK.**	You return to the Bandwidth-On-Demand Definition window.
7. Click on **Done**.	You return to the Configuration Manager window.

Enabling BAP for Bandwidth-on-Demand Service

BAP enables you to manage the allocation of bandwidth for links in a multilink bundle, that is, the dial-up circuits that relieve the congested bandwidth circuit. Before enabling this protocol, you need to configure bandwidth-on-demand service according to the instructions in Chapter 2 and this chapter. For an overview of BAP, see Chapter 8, "Bandwidth-on-Demand Implementation Notes."

To configure BAP:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens.
3. Click on **Options**.	The Bandwidth-On-Demand Monitor Options window opens.
4. Set the following parameters: • **BAP Enable** • **BAP No Phone Number Needed** Click on **Help** or see the parameter descriptions beginning on page A-88.	
5. Click on **OK**.	You return to the Bandwidth-On-Demand Circuit Definition window.
6. Click on **Done**.	You return to the Configuration Manager window.

Removing Bandwidth-on-Demand Service

To remove bandwidth-on-demand service:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Bandwidth on Demand Circuits**.	The Bandwidth-On-Demand Circuit Definition window opens.
3. Click on **Cct Type**.	The Circuit Options window opens.
4. Set the **Circuit Type** parameter to **Normal** then click on **OK.** Click on **Help** or see the parameter description on page A-78.	You return to the Circuit Options window.
5. Click on **OK**.	Site Manager asks you to confirm your change to a normal circuit.
6. Click on **OK**.	You return to the Bandwidth-On-Demand Circuit Definition window. Site Manager treats the dial-up circuits as regular leased circuits.
7. Click on **Done**.	You return to the Configuration Manager window.

Chapter 15
Customizing Phone Lists

The router uses phone lists for calls to and from remote routers. If any of the lines in your pool are ISDN lines, or modem lines using V.25bis or Hayes signaling, you must set up phone lists. If a line uses Raise DTR signaling, the phone numbers are already stored in the modem, so phone lists are unnecessary.

This chapter includes the following information:

Topic	Page
Types of Phone Lists	15-1
How ISDN Calls Use Phone Lists	15-2
How V.25bis and Hayes Calls Use the Outgoing Phone List	15-3
Modifying an Outgoing Phone List	15-4
Creating an Incoming Phone List (ISDN Only)	15-19
Creating a Local Phone List (ISDN Only)	15-23

Types of Phone Lists

You can configure the following types of phone lists for the router:

- Outgoing phone list
- Incoming phone list (for ISDN only)
- Local phone list (for ISDN only)

The *outgoing phone list* and *incoming phone list* contain the phone numbers of remote routers. The router places outgoing calls using numbers in the outgoing phone list and verifies incoming calls using numbers in the incoming phone list. Each remote router may have one or more phone numbers. The router dials the phone numbers in the order in which they occur in the list.

The *local phone list* contains the local router's phone numbers. It uses these numbers to identify itself when it places an outgoing call.

Note: Outgoing phone lists are associated with a specific circuit, not with the line, which the router uses for many different circuits. Consequently, the phone numbers are part of each circuit's configuration, not the line's configuration.

The following sections describe how the router uses phone lists for ISDN and modem calls.

How ISDN Calls Use Phone Lists

For ISDN calls, the router uses the outgoing, incoming, and local phone lists. The instructions to configure each phone list begin on page 15-4.

Outgoing and Incoming Phone Lists

The router uses the outgoing phone list to place calls to remote routers on an ISDN network.

The router uses the incoming phone list to implement incoming call filtering. Incoming call filtering is a security feature that lets you identify a remote caller. To operate this feature, you must purchase caller ID service from your ISDN provider.

If you enable incoming call filtering, the router matches the caller's phone number with a number in the incoming phone list. The list contains the phone numbers of only authorized callers. If the number is not in the list, the router rejects the call.

Features such as callback for demand circuits rely on incoming call filtering for certain callback modes. For more information about the callback feature, see “Callback” on page 6-5.

Caution: To use incoming call filtering, you must purchase caller ID service. If you enable incoming call filtering without having caller ID service, the router rejects all incoming calls.

Local Phone Lists

For BRI connections, the router uses the local phone list for the following purposes:

- To identify itself when it places a call to a remote router. The local router includes its own phone number in the ISDN outgoing call setup message.
- To identify itself to the ISDN switch so that the switch can activate the circuit. In the United States and Canada, the Service Provider ID (SPID) is also required.
- To ensure that an incoming call was received at the intended destination. When the local router receives a call, it checks that the phone number in the incoming call setup message is the same as its own local phone number.
- To facilitate BAP negotiations for bandwidth-on-demand service. The non-monitor router passes a local phone number to the monitor router when the monitor router requests additional bandwidth. When the monitor router receives the phone number, it uses that number to call back the non-monitor router, which then activates another line.

How V.25bis and Hayes Calls Use the Outgoing Phone List

For V.25bis and Hayes calls, the router uses only the outgoing phone list. The router passes the remote router’s phone number to the modem to establish a connection.

Modifying an Outgoing Phone List

If you set up an ISDN, V.25bis, or Hayes signaling for the configuration in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC,” you have already set up an outgoing phone list.

The following sections explain how to modify the phone lists.

Adding Phone Numbers

You must provide the phone number of the remote router that the router will call. You can add phone numbers to the outgoing phone list using either the BCC (dial-on-demand and dial backup only) or Site Manager.

Using the BCC

This section assumes that you already configured one outgoing phone number in Chapter 2, “Starting Dial Services Using Site Manager” or Chapter 3, “Starting Dial Services Using the BCC.”

To add phone numbers to the outgoing phone list, navigate to the demand-circuit or backup-circuit prompt and enter:

out-phone-number <*string*>

string is a numeric string up to 25 characters. Do not enter space, special, or alphabetic characters in the telephone number.

For example:

```
backup-circuit/8/5/1# out-phone-number 9786665432
```

or

```
demand-circuit/to-phoenix# out-phone-number 8765432
```

You can also include a subaddress/extension to further identify the remote router. For ISDN calls, this subaddress is useful when there are several routers at a destination site, but the ISDN provider only assigns the destination one phone number. An incoming call must specify the number and subaddress to reach a specific router.

To configure an extension, navigate to the out-phone-number prompt and enter:

subaddress-extension <*string*>

string is a numeric string up to 25 characters. Do not enter space, special, or alphabetic characters in the subaddress.

For example:

```
out-phone-number/backup/8/1/9786665432# subaddress-extension 456
```

For V.25bis calls only, you can also specify a delimiter as part of the phone number. The delimiter separates the phone number from the extension if the remote device requires one. Use a character or set of characters that the remote device accepts.

To specify a delimiter, navigate to the out-phone-number prompt and enter:

phone-delimiter <*string*>

string can be any number of characters up to a maximum of five characters.

For example, to use a slash as the delimiter character for a demand circuit, enter:

```
out-phone-number/to-phoenix/8/1/9786665432# phone-delimiter \
```

To list all the phone list entries for a particular demand or backup circuit, navigate to the demand or backup circuit prompt and enter:

lso

You can also use the relevant **show** command to display a complete or partial list of out-phone-number entries. See Appendix C, “BCC show Commands.”

Using Site Manager

To create an outgoing phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Select a circuit and click on **Phone Out**.	The Outgoing Phone List window opens.
4. Click on **Add**.	The Phone Number window opens. The router dials the phone numbers in the order in which they occur in the list.
5. Set the **Outgoing Phone Number** parameter. Click on **Help** or see the parameter description on page A-95.	
6. Set the following parameters, if applicable: • **Outgoing Phone Ext/SubAddr** • **Outgoing Phone Delimiter** Click on **Help** or see the parameter descriptions beginning on page A-96.	
7. Click on **OK**.	You return to the completed Outgoing Phone List window.
8. Accept the defaults for the remaining parameters or modify them according to the descriptions in Appendix A.	
9. Repeat the procedure for each phone number that you want to add to the list.	
10. Click on **Done**.	You return to the appropriate circuit window.
11. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Phone Number Type

You can specify whether the phone number is for a V.25bis, Hayes, or direct ISDN network connection by specifying the phone number type.

If you have a line pool that combines ISDN, V.25bis, and Hayes signaling, the destination phone number for some lines may be the same. If this is the case, you need to enter the destination phone number twice, once as type ISDN and once as type Dial Sync (Site Manager), Dial (BCC) or Dial Async. The router then has two lines to dial the call.

You can duplicate the same phone number for a circuit using Site Manager.

Using the BCC

To specify the phone number type, navigate to the out-phone-number prompt and enter:

phone-number-type <*type*>

type can be any of the values in Table 15-1.

Table 15-1. Phone Number Type Options

Type	Function
dial	For a router using V.25bis signaling. This is the default value.
dialasync	For a router using Hayes signaling
isdn	For a router that establishes the connection over an ISDN line. You must ensure that the router supplies values for the isdn-number-type and isdn-number-plan parameters. See the next section.

For example, to specify that the phone number 9786665432 is for an ISDN connection, enter:

```
out-phone-number/backup/8/1/9786665432# phone-number-type isdn
```

Specifying the ISDN Number Type and Plan

The **isdn-number-type** parameter indicates the standard that the phone number follows. The router passes this information to the ISDN switch. Accept the default value, unknown, unless your service provider explicitly instructs you to use another value.

The **isdn-number-plan** parameter indicates the standard that the phone number plan follows. The router passes this information to the ISDN switch. If you set the switch-type parameter to brintt, brikdd, or brini1, set the **isdn-number-plan** parameter to unknown. For all other switches, use the default value telephony, unless instructed otherwise by your service provider.

If your service provider instructs you to change the **isdn-number-type** parameter and **isdn-number-plan** parameter, set the values by navigating to the out-phone-number prompt and entering:

isdn-number-type <*type*> **isdn-number-plan** <*plan*>

type can be one of the following:

unknown	specific
international	subscriber
national	abbreviated

plan can be one of the following:

unknown	telex
telephony	standard
x121	private

For example, to set the ISDN number plan and type for a backup circuit enter:

`out-phone-number/backup/8/1/9786665432#` **isdn-number-type unknown isdn-number-plan standard**

Using Site Manager

To specify the phone number type, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Select a circuit and click on **Phone Out**.	The Outgoing Phone List window opens.
4. Click on **Add**.	The Phone Number window opens.
5. Set the **Outgoing Phone Number Type** parameter. Click on **Help** or see the parameter description on page A-98.	
6. For Hayes dialing only, set the **Outgoing Phone Prefix** parameter. Click on **Help** or see the parameter description on page A-104.	
7. Click on **OK**.	You return to the completed Outgoing Phone List window.
8. If the **Outgoing Phone Number Type** parameter is set to **ISDN**, accept the defaults for the **ISDN Numbering Type** and **ISDN Numbering Plan** parameters, unless your service provider instructs otherwise. For **Dial Sync** or **Async** phone numbers, ignore the ISDN parameters.	
9. Accept the defaults for the remaining parameters or modify them according to the descriptions in Appendix A.	
10. Repeat the procedure for each phone number that you want to add to the list.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
11. Click on **Done** when you finish entering outgoing phone list numbers.	You return to the appropriate circuit window.
12. Click on **Done**.	You return to the Configuration Manager window.

Reordering and Deleting Phone Numbers

You can modify existing phone numbers using Site Manager. Using the BCC, you must delete an existing phone number, then add a new number. The next two sections describe how to make these modifications.

Using the BCC

You cannot modify an existing phone number. You must delete the phone number you want to change and enter a new one.

To delete numbers from the outgoing phone list, navigate to the out-phone-number prompt for the number you want to delete and enter:

delete

For example, to delete an outgoing phone number for a demand circuit, enter:

```
out-phone-number/to-phoenix/8/1/5085556879# delete
```

Using Site Manager

To modify the outgoing phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Select a circuit and click on **Phone Out**.	The Outgoing Phone List window opens.
4. Modify the phone number list using these guidelines: • **Order of numbers** -- The order in which you enter the phone numbers is the order in which the router dials the numbers. To insert a number between two existing numbers, select the number that the new number should follow, then click on **Add After**. • **Changing numbers** -- If you want to change a phone number, click in the field for the parameter you want to modify. Enter a new value, then click on **Apply**. The phone number appears with the changes at the top of the window. • **Deleting numbers** -- If you want to delete a phone number, select the phone number and extension, if any, and click on **Delete**. Site Manager deletes the number.	
5. Click on **Done**.	You return to appropriate circuits window.
6. Click on **Done**.	You return to the Configuration Manager window.

Modifying a Call's Adaption Rate

For ISDN calls only, the adaption rate specifies the rate at which the local router wants to send data to the remote destination.

Enter a value of 56 Kb/s if the connections to the destination device only support this rate; otherwise, accept the default, 64 Kb/s. If you are unsure of your network connections, ask your network provider.

If the value of this parameter is less than the value of the Global Adaption Rate parameter, then this value overrides the global adaption rate value. For example, if this parameter is set to 56 Kb/s and the global adaption rate is set to 64 Kb/s, the router uses the rate of 56 Kb/s for the outgoing call.

If the value of the parameters is equal, or if you set only the global adaption rate, the router uses the global value and ignores the outgoing phone number's value.

If no value is set for either parameter, the router uses the default, 64 Kb/s.

For more information about adaption rates, see Chapter 5, "Implementation Notes for All Dial Services."

Using the BCC

To set the adaption rate of a call, navigate to the out-phone-number prompt and enter:

adaption-rate <*rate*>

rate can be either rate64K or rate56K.

For example, to set an adaption rate of 56 Kb/s, enter:

```
out-phone-number/backup/8/1/5085556879# adaption-rate rate56K
```

Using Site Manager

To set the adaption rate:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Choose **Phone Out**.	The Outgoing Phone List window opens.
4. Set the **Adaption Rate** parameter. Click on **Help** or see the parameter description on page A-100.	
5. Click on **Done**.	You return to the appropriate circuit window.
6. Click on **Done**.	You return to the Configuration Manager window.

Changing the Remote Pool Type

Using Site Manager, you can configure the remote pool type. The remote pool type specifies whether the remote router's line associated with the outgoing phone number is in a demand pool, bandwidth pool, or both. The router then uses only the outgoing phone numbers whose values for this parameter match the pool type of the destination connection. This parameter is for applications that use bandwidth-on-demand to aid congested demand circuits.

By configuring the Remote Pool Type parameter, you prevent the local circuit from using a phone number associated with the wrong type of remote pool. If a demand circuit places a call to a bandwidth pool, the remote router terminates the call.

To set the remote pool type:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Choose **Phone Out**.	The Outgoing Phone List window opens.
4. Set the **Remote Pool Type** parameter. Click on **Help** or see the parameter description on page A-101.	
5. Click on **Done**.	You return to the appropriate circuit window.
6. Click on **Done**.	You return to the Configuration Manager window.

Configuring the Phone Number for Single or Multiple Calls

You can configure the phone numbers in your outgoing phone list for a single call or multiple calls. This feature is for applications that use bandwidth-on-demand to aid congested demand circuits.

Using the BCC

To set the connection type, navigate to the demand-circuit or backup-circuit prompt and enter:

connection-type <*type*>

type can be:

single - Choose single if the remote destination can only support a single connection with this outgoing phone number. If a circuit on the same slot is already using this phone number, the router will use another phone number in the list.

Choosing the single option is particularly important if the line is connected to an external device such as a modem. If the router places a call to device that is busy, it takes a long time before the router determines that the device is unavailable. By selecting single, you eliminate this loss of time.

multiple - The default option; instructs the router to use the phone number for multiple calls. For example, if you are using PRI service, you have many channels that can use the same phone number to place a call. Therefore, you would select multiple for this parameter.

For example, to specify a **connection-type** parameter for a backup circuit, enter:

```
out-phone-number/backup/8/1/5085556879# connection-type single
```

Using Site Manager

To set the connection type:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Choose **Phone Out**.	The Outgoing Phone List window opens.
4. Set the **Connection Type** parameter. Click on **Help** or see the parameter description on page A-102.	
5. Click on **Done**.	You return to the appropriate circuit window.
6. Click on **Done**.	You return to the Configuration Manager window.

Enabling PRI Multirate

PRI multirate lets you group B channels in multiples of 64 Kb/s to dynamically allocate bandwidth on a call-by-call basis. Both ends of the connection need to support multirate for it to work.

If you enable multirate, you must also specify the number of B channels that the router groups together for a call.

For more information about PRI multirate, see “PRI Multirate” on page 5-15.

Using the BCC

To enable PRI multirate, navigate to the out-phone-number prompt and change the channel-bandwidth-type parameter by entering:

channel-bandwidth-type multirate

The default for this parameter is bchannel. Accept this value for nonmultirate calls.

After you enable multirate, specify the number of B channels that the router can use for multirate service by entering:

aggregate-bandwidth <*integer*>

integer is the number of B channels from 2 to 23.

For example:

`out-phone-number/backup/8/1/5085556879#` **channel-bandwidth-type multirate aggregate-bandwidth 10**

Using Site Manager

To enable PRI multirate:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Choose **Phone Out**.	The Outgoing Phone List window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Set the following parameters: • **Channel Bandwidth Type** • **Aggregate Bandwidth** Click on **Help** or see the parameter descriptions beginning on page A-103.	
5. Click on **Done**.	You return to the appropriate circuit window.
6. Click on **Done**.	You return to the Configuration Manager window.

Changing the AT Command String (Hayes Only)

For asynchronous PPP connections only, you can specify a prefix that the router sends to the modem to initiate dialing.

Accept the default, ATDT, or enter a valid AT initialization command. See Appendix E for a list of AT initialization commands for the ARN. Because your modem may use a different set of commands, consult the manual for that modem.

Using the BCC

To set a phone number prefix, navigate to the out-phone-number prompt and enter:

phone-number-prefix <*string*>

string is any valid AT command string.

For example, to set the prefix for the backup circuit, enter:

```
out-phone-number/backup/8/1/5085556879# phone-number-prefix M3
```

Using Site Manager

To set the phone number prefix:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand**, **Backup**, or **Bandwidth on Demand Circuits**.	For backup and bandwidth circuits, the appropriate Circuit Definition window opens. For demand circuits, the Demand Pools window opens. Click on **PPP Circuits** or **FR Circuits** to open the appropriate Demand Circuits window.
3. Choose **Phone Out**.	The Outgoing Phone List window opens.
4. Set the **Outgoing Phone Prefix** parameter. Click on **Help** or see the parameter description on page A-104.	
5. Click on **Done**.	You return to the appropriate circuit window.
6. Click on **Done**.	You return to the Configuration Manager window.

Creating an Incoming Phone List (ISDN Only)

You configure an incoming phone list to use incoming call filtering. Features such as callback rely on incoming call filtering for certain callback modes.

Using the BCC

To create an incoming phone list, navigate to the isdn-in-phone-list prompt by entering the following command at the box prompt:

isdn-in-phone-list

To add a phone number to the incoming phone list, enter:

in-phone-number <*number*>

number is a numeric string, up to 25 characters, for the incoming phone number.

For example:

```
isdn-in-phone-list# in-phone-number 1234566
```

Using Site Manager

To create an incoming phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Incoming Phone Numbers**.	The Incoming Phone List window opens.
3. Click on **Add**.	The Phone Number window opens.
4. Set the following parameters: • **Incoming Phone Number** • **Incoming Phone Ext/SubAddr** Click on **Help** or see the parameter description on page A-105.	If this is a demand circuit for which you enabled the callback feature, the Phone Number window displays a third parameter, Callback Demand Circuit Name.
5. If you enabled the callback feature, and the callback mode is **Server One Charge** or **Server One Charge Call ID**, enter a value for the **Callback Demand Circuit Name** parameter. Click on **Help** or see the parameter description on page A-106.	
6. Click on **OK**.	You return to the completed Incoming Phone List window.
7. Repeat steps 3 through 6 for each phone number that you want to add to the list. Be sure to enter the phone number of each remote node from which the router should accept calls.	
8. Click on **Done**.	You return to the Configuration Manager window.

Modifying Numbers in the Incoming Phone List

You can modify the phone numbers in the incoming phone list.

Using the BCC

To modify the incoming phone list, you must delete existing numbers and add new ones.

To delete a phone number, navigate to the in-phone-number prompt and enter:

delete

To add a phone number, see "Creating an Incoming Phone List (ISDN Only)" on page 15-19.

Using Site Manager

To modify the incoming phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Incoming Phone List**.	The Incoming Phone List window opens.
3. Modify the incoming phone number list. • To change a phone number, click in the field for the parameter that you want to modify. Enter a new value, then click on **Apply**. The phone number appears with the changes at the top of the window. • To delete a phone number, select the phone number and extension, if any, and click on **Delete**.	
4. Click on **Apply**.	The new phone number appears in the list.
5. Click on **Done**.	You return to the Configuration Manager window.

Using the Incoming Phone List for Callback Service

If the callback mode of your router is Server One Charge or Server One Charge Call ID, the router uses incoming call filtering to identify the client, not PPP authentication, which relies on the caller resolution table. Using incoming call filtering, the router can maintain security while refusing the initial call from the client to save the client phone charges.

When the server uses incoming filtering, it relies on the incoming phone number to identify the client. When the server receives the call from the client, it matches the client's phone number with a phone number and circuit number in the incoming phone list. The circuit number identifies the circuit that the server uses to place the outgoing call back to the client.

Using the BCC

To use the callback modes Server One Charge and Server One Charge Call ID, you specify a circuit name after you specify a phone number. This command is optional.

To add a phone number and configure a circuit name, navigate to the isdn-in-phone-list prompt and enter:

in-phone-number <*number*> **circuit-name** <*name*>

number is a numeric string, up to 25 characters, that represents the incoming phone number.

name is the name of an available local demand circuit that corresponds to the incoming phone number. The server uses this circuit to call back the client.

For example, to add the phone number 1234567 and specify the callback circuit to-Boston, enter:

`isdn-in-phone-list#` **in-phone-number 1234567 circuit-name to-Boston**

Remember, you must also enable incoming call filtering. For instructions, see "Enabling Incoming Call Filtering" on page 11-8.

Using Site Manager

The Callback Demand Circuit Name parameter is located in the Incoming Phone List window. For configuration instructions, see "Creating an Incoming Phone List (ISDN Only)" on page 15-19.

Remember, you must also enable incoming call filtering. For instructions, see "Enabling Incoming Call Filtering" on page 11-8.

Creating a Local Phone List (ISDN Only)

Using the BCC or Site Manager, you can configure a local phone list for any demand or backup service that uses BRI and PRI lines, but this list is optional. For bandwidth-on-demand connections that use BRI and PRI lines and BAP negotiation, you must configure the local phone list.

When you enter local phone numbers, enter the phone number that your ISDN provider supplied when you received ISDN service. For switches in the United States, do not include the area code when you enter the phone number.

Any remote party that calls the router must include this phone number in the Called Party IE field of the call setup message. The Called Party IE must match the directory number exactly or the router will not answer the call.

For switches in the United States and Canada, you may also have to configure the Service Profile Identifier (SPID). The SPID identifies an ISDN device to the switch so that it knows which services to provide.

Using the BCC

To configure phone numbers for a local phone list, navigate to the pri or channel (for bri) prompt and enter:

local-phone-number phone-number <*number*>

number is a numeric string up to 20 characters.

For example:

```
pri/2/1# local-phone-number phone-number 5553427
```

If necessary, you can enter a subaddress for the main phone number. The subaddress is useful when you have several routers at a destination site, but the ISDN provider assigns only one phone number to the destination site. To reach a specific router, an incoming call has to specify both the number and the subaddress.

After a phone number is configured, you can specify a subaddress. Navigate to the local-phone-number prompt and enter:

subaddress-extension <*number*>

number is a numeric string up to 25 characters.

For example, to set an extension for the local phone number 5553427, enter:

```
local-phone-number/2/1/5553427# subaddress-extension 897
```

If necessary, enter the SPID supplied by your ISDN provider when you ordered service. Ignore this parameter if you have a 5ESS switch and the **line-type** parameter is set to **point-to-point**.

To set the SPID, navigate to the local-phone-number prompt and enter:

spid <*string*>

string is a numeric string up to 20 characters.

For example, to specify a SPID for the local phone number 5553427, enter:

```
local-phone-number/2/1/5553427# spid 1212
```

In addition to the local phone number, you can define the ISDN number type and plan to indicate the standard that the phone number follows. The router passes this information to the ISDN switch.

To specify the ISDN number type, navigate to the local-phone-number prompt and enter:

isdn-number-type <*type*> **isdn-number-plan** <*plan*>

type can be one of the following:

unknown	specific
international	subscriber
national	abbreviated

plan can be one of the following:

unknown	telex
telephony	standard
x121	private

For example:

`local-phone-number/2/1/5553427#` **isdn-number-type national isdn-number-plan telephony**

Using Site Manager

To create a local phone list:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Local Phone Numbers**.	The ISDN Local Phone Lines window opens.
3. Click on **Local Phones**.	The ISDN Local Phone Numbers window opens. The **SPID** parameter appears only for switches in the United States and Canada.
4. Click on **Add**.	The Phone Number window opens.
5. Set the following parameters: • **Directory Number** • **Ext/SubAddr** • **ISDN Numbering Type** • **ISDN Numbering Plan** Click on **Help** or see the parameter descriptions beginning on page A-91.	
6. If necessary, set the **SPID** parameter; otherwise, go to step 7. Click on **Help** or see the parameter description on page A-92.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Click on **OK**.	You return to the completed ISDN Local Phone Numbers window.
8. Click on **Done**.	You return to the Configuration Manager window.

Modifying the Local Phone List

You can delete local phone numbers using the BCC. You can change or delete numbers in the local phone list using Site Manager.

Using the BCC

To delete local phone numbers from the local phone number list, navigate to the local-phone-number prompt and enter:

delete

For example:

`local-phone-number/2/1/5553427#` **delete**

Using Site Manager

To change or delete a local phone number:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Local Phone Numbers**.	The ISDN Local Phone Lines window opens.
3. Click on **Local Phones**.	The ISDN Local Phone Numbers window opens. The **SPID** parameter appears only for switches in the United States and Canada.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Modify the local phone list, as follows: • **Changing numbers** -- To change a phone number, click in the field for the parameter that you want to modify. Enter a new value, then click on **Apply**. The phone number appears with the changes at the top of the window. • **Deleting numbers** -- To delete a phone number, select the phone number and extension, if any, and click on **Delete**. Site Manager deletes the number.	
5. Click on **OK**.	You return to the ISDN Local Phone Numbers window.
6. Click on **Done**.	You return to the Configuration Manager window.

Chapter 16
Customizing Caller Resolution

This chapter explains how to modify your caller resolution information using the BCC (dial-on-demand and dial backup only) and Site Manager. It contains the following topics:

Topic	Page
Caller Resolution for Demand Circuit Groups	16-2
Adding Entries to the Caller Resolution Table	16-3
Modifying Entries in the Caller Resolution Table	16-6
Deleting a Caller Resolution Entry	16-7

For security purposes, all three dial services use a PPP identification mechanism to determine who is calling the router. PPP performs this identification process using one of two authentication protocols: CHAP or PAP.

Note: RADIUS clients that use dial services identify remote callers using vendor-specific attributes (VSAs), not a caller resolution table. In this case, do not configure a caller resolution table.

CHAP is the default authentication protocol. To configure PAP, you must modify the PPP interface configuration and either modify the Site Manager parameter Local Authentication Protocol, or the BCC parameter **authentication-protocol** before setting up the caller resolution table.

For instructions on how to set the Site Manager parameter, see *Configuring PPP Services*. For instructions on how to set the BCC parameter, see “Changing the Authentication Protocol” on page 12-16.

Note that when you configure a PPP connection using Site Manager, it creates a generic PPP line record that all pools use for identification.

To identify remote callers, you enter the caller name and CHAP secret or PAP password of each remote caller in the caller resolution table. Then, assign a local demand, primary, or bandwidth circuit to each caller.

The authentication process starts during link negotiation. The remote caller includes its CHAP name or PAP ID in the CHAP challenge or PAP authenticate request to the called router. When the called router receives the call, it checks its caller resolution table for a matching entry. If the remote caller is authorized, the called router activates the assigned circuit.

For more information about authentication, see Chapter 5, “Implementation Notes for All Dial Services.”

Caller Resolution for Demand Circuit Groups

The router also uses the caller resolution table for demand circuit groups. Demand circuit groups can only receive calls. For a demand circuit group to accept an incoming call, you configure the table and assign the demand circuit group to a remote caller. After the router authorizes a remote caller, it activates a circuit from the assigned demand circuit group.

Like individual demand circuits, demand circuit groups use either PAP or CHAP for authentication. You can enable either of these authentication protocols on only one side of the link (*one-way authentication)* or on both sides of the link (*two-way authentication*). For information about authentication, see “PPP Authentication” on page 5-1

Depending on a network’s security requirements, each remote router can have a unique CHAP name or PAP ID, or the routers can use the same name. For each remote caller using a unique name or ID, you assign a demand circuit group in the caller resolution table (referred to as the *local group* in Site Manager). The remote callers may use the same local group.

When the router authenticates an incoming call, it receives the caller’s name or ID in the CHAP challenge or PAP authenticate request message. The router verifies the caller’s identity, then looks up the assigned local group in the table. From this group, the router selects an available circuit and activates the unnumbered protocol configuration over that circuit.

To simplify configuration, the caller resolution table may contain the same PAP ID or CHAP name for all remote routers in the network. In this case, the table has only one entry consisting of the caller name and the local group.

A router configured with demand circuit groups does not initiate connections for the group; the remote side of the connection must place the call first. Consequently, you do not need to configure the CHAP local name and secret or the PAP ID and password for a call request.

Note: The caller resolution table cannot contain individual demand circuits and demand circuit groups for the same caller name.

For added network security, each remote router can have a unique PAP ID or CHAP name but use the same demand circuit group. In this case, the router verifies the remote router's name in the incoming call setup message. If it does not match a name in the caller resolution table, the router disconnects the call.

Adding Entries to the Caller Resolution Table

For PPP dial-up circuits using CHAP, you should have already set up the caller resolution table according to the instructions in Chapter 2, "Starting Dial Services Using Site Manager," or Chapter 3, "Starting Dial Services Using the BCC."

This chapter explains how to modify existing entries in the table and how to add new ones.

Before you set up your caller resolution table, you should have completed your dial-on-demand, dial backup, or bandwidth-on-demand configurations.

Using the BCC

This section assumes that you have already created one caller resolution table, as described in Chapter 3, "Starting Dial Services Using the BCC."

For each additional entry, you must create an independent caller resolution entry, which must include a caller name.

To add a caller resolution entry, navigate to the PPP demand circuit prompt or the backup circuit prompt, and enter:

caller-resolution caller-name <*name_string*>

name_string is any text string up to 20 characters. This name is part of the incoming call and informs the local router of the remote router's identity.

For example, to configure a caller resolution entry for a backup circuit, enter:

```
backup-circuit/8/5/1# caller-resolution caller-name blncorp
```

You cannot modify an existing caller name for a caller resolution table entry. You must delete the entry and create a new one with a new caller name.

After you configure a caller resolution table entry, you can specify either the CHAP secret or the PAP password, depending on the authentication protocol used for the dial circuit.

Configuring the CHAP Secret

If you enter a CHAP name for the caller name, you must configure a CHAP secret. Navigate to the caller-resolution prompt and enter:

secret <*string*>

string is any text string up to 20 characters.

The CHAP secret must be the same on both sides of the connection.

For example, to specify the CHAP secret for blncorp, enter:

```
caller-resolution/blncorp# secret bayeast
```

Configuring the PAP Password

If you enter a PAP ID for the caller name, configure a PAP password by navigating to the caller-resolution prompt and entering:

pap-password <*string*>

string is any text string up to 25 characters.

The PAP password must be the same on both sides of the connection.

During the authentication phase, all password authenticate-request messages that the calling router sends to the called router must include the correct password. If the password is not correct, the called router sends an authenticate-negative acknowledgment (authenticate-NAK) message and the calling router does not activate the connection.

For example, to specify the PAP password for blncorp, enter:

```
caller-resolution/blncorp# pap-password baywest
```

Using Site Manager

To configure the caller resolution table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add** to add an entry to the table.	The Caller Name and Secret/Password window opens.
4. Set the following parameters: • **Caller Name** • **CHAP Secret** • **PAP Password** Click on **Help** or see the parameter descriptions beginning on page A-107.	
5. If this entry is for a demand circuit group, set the **Local Group** parameter. Click on **Help** or see the parameter description on page A-109. If not, go to step 6.	
6. Click on **OK**.	The Local Circuit List window opens, listing the previously configured demand, primary, or bandwidth circuits.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Set the **Local Circuit** parameter by selecting a local circuit then click on **OK**. Click on **Help** or see the parameter description on page A-109.	You return to the completed Caller Resolution Table window.
8. Click on **Done**.	You return to the Configuration Manager window.

Modifying Entries in the Caller Resolution Table

Using the BCC, you can only delete entries and create new ones; you cannot modify an existing caller resolution entry.

Using Site Manager, you can change entries in the caller resolution table:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Specify a new value for the parameter that you want to modify. Click on **Help** or see the parameter descriptions beginning on page A-107. For the **Local Circuit** and **Local Group** parameters, you must click on **Values** and select a different circuit from the list; then click on **OK**.	
4. Click on **Apply**, and then click on **Done**.	You return to the Configuration Manager window.

Deleting a Caller Resolution Entry

You can delete any caller resolution table entry using the BCC (demand and backup only) or Site Manager.

Using the BCC

To delete a caller resolution table entry, navigate to the caller-resolution prompt and enter:

delete

For example:

```
caller-resolution/blncorp# delete
```

Using Site Manager

To delete a caller resolution table entry:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. To delete an entry, select it and click on **Delete**.	
4. Click on **Done**.	You return to the Configuration Manager window.

Appendix A
Site Manager Parameters

After you configure a dial service, you can modify any parameter for your network. This appendix describes each of the dial service parameters that you can configure. The parameters are grouped by function and do not always follow the order in which they appear in the Site Manager windows. Table A-1 shows how the parameters are organized in this appendix.

Table A-1. Organization of Parameters

Parameter Section	Page
Pool ID Parameter	A-4
WAN Serial Interface Type Parameter	A-5
Sync and Async Line Media Type Parameters	A-6
External Modem Parameters	A-9
V.34 Modem Parameters	A-15
Port Application Mode Parameters	A-18
ISDN Switch Parameters	A-20
Pool Channel Count and Priority Parameters	A-24
BRI Configuration Parameters	A-27
BRI Leased-Line Configuration Parameters	A-32
Demand Circuit Parameters (PPP and Frame Relay)	A-34
Standby Circuit Parameters (PPP Demand Circuits Only)	A-41
Callback Parameters (PPP Demand Circuits Only)	A-43
Authentication Protocol Parameters	A-46
Circuit Duration Parameters (Demand and Dial Backup)	A-51
Circuit Schedule Parameters (Demand and Dial Backup)	A-55

(continued)

Table A-1. Organization of Parameters *(continued)*

Parameter Section	Page
Demand Circuit Group Parameters	A-62
Demand Circuit Group Protocol Parameters	A-63
Caller Resolution Info Parameters (Demand Circuit Groups)	A-63
PPP Circuit Options Parameters (Dial Backup)	A-67
PPP Primary Circuit Definition Parameters (Dial Backup)	A-69
Frame Relay Interface Parameters (Dial Backup)	A-71
Frame Relay Primary Interface Definition Parameters (Dial Backup)	A-74
Frame Relay Service Control Parameter (Demand and Dial Backup)	A-76
Frame Relay PVC and Service Parameters (Demand and Dial Backup)	A-77
Bandwidth-on-Demand Circuit Options Parameters	A-77
Bandwidth-on-Demand Circuit Definition Parameters	A-80
Bandwidth-on-Demand Congestion Monitor and BAP Parameters	A-82
Local Phone Number Parameters	A-90
Outgoing Phone List Parameters	A-94
Incoming Phone List Parameters	A-105
Caller Resolution Table Parameters	A-107

Each parameter description begins with the Site Manager path that leads to the parameter. Each path assumes that you begin at the Configuration Manager window.

Two of the windows apply to all three dial services; the names of these windows have been shortened to make the paths easier to follow (Table A-2).

Table A-2. Abbreviated Site Manager Window Titles

Full Name	Abbreviated Name
Demand Pools, Backup Pools, Bandwidth-On-Demand Pools	Pools
Demand Lines Definition, Backup Lines Definition, Bandwidth-On-Demand Lines Definition	Lines Definition

You can use Site Manager to edit all dial service parameters.You can also use the Technician Interface to modify parameters by issuing **set** and **commit** commands with the management information base (MIB) object ID. This process is the same as modifying parameters using Site Manager. For more information about using the Technician Interface to access the MIB, see *Using Technician Interface Software*.

Caution: The Technician Interface does not verify that the value you enter for a parameter is valid. Entering an invalid value can corrupt your configuration.

Pool ID Parameter

The Pool Configuration window contains the Pool ID parameter (Figure A-1).

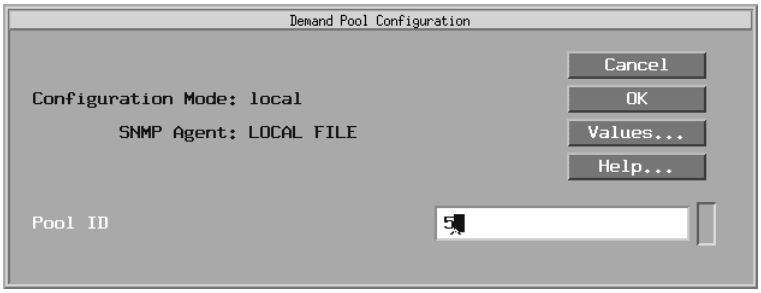

Figure A-1. Demand Pool Configuration Window

Parameter: Demand/Backup/Bandwidth Pool ID

Path: Dialup > Demand/Backup/Bandwidth On Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth On Demand Pool Configuration

Default: None

Options: 1 to 255

Function: Identifies the line pool by assigning it a number.

Instructions: Enter a number between 1 and 255, inclusive, as the line pool ID.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.6 (Demand Pool ID)

1.3.6.1.4.1.18.3.5.1.4.5.1.5 (Backup Pool ID)

1.3.6.1.4.1.18.3.5.1.4.5.1.35 (Bandwidth Pool ID)

WAN Serial Interface Type Parameter

The Choose WAN Serial Interface Type window (Figure A-2) defines whether the serial interface is synchronous or asynchronous.

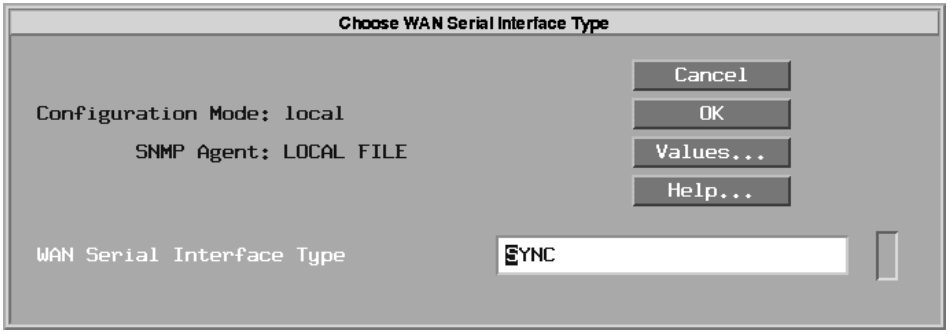

Figure A-2. Choose WAN Serial Interface Type Window

Parameter: WAN Serial Interface Type

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **COM** Connector > Choose Wan Serial Interface Type

Default: Sync

Options: Sync | Async | Pasync (not applicable for dial services)

Function: Determines whether this interface uses synchronous communication or asynchronous communication.

Instructions: If you are using asynchronous PPP, select Async. Otherwise, accept the default.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.109

Sync and Async Line Media Type Parameters

The Line Media Type windows (Figures A-3 and A-4) contain the physical interface parameters for the dial line.

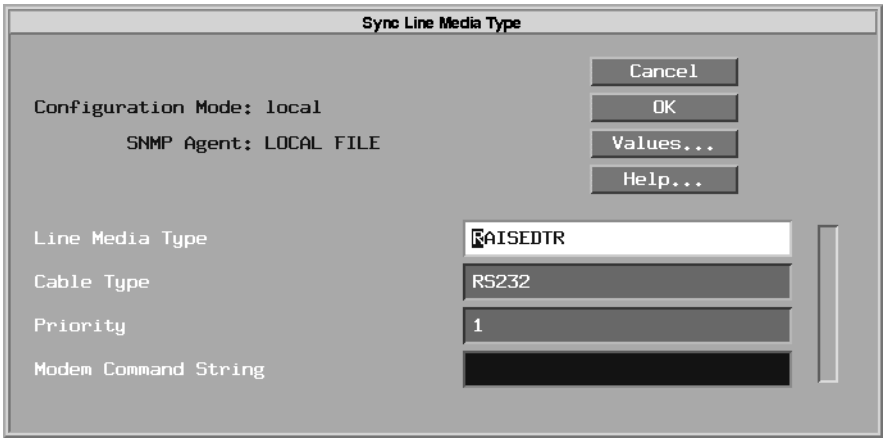

Figure A-3. Sync Line Media Type Window

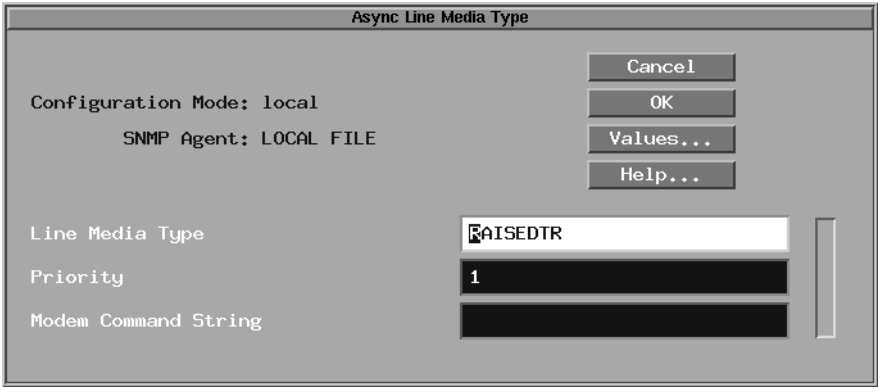

Figure A-4. Async Line Media Type Window

The parameter descriptions follow.

Parameter: Line Media Type

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **COM** Connector > Choose Wan Serial Interface Type > **OK** > Sync or Async Line Media Type

Default: Raise DTR

Options: Raise DTR │ V25bis │ Hayes

Function: Specifies the signaling method that the router uses to interact with the modem.

Instructions: Choose one of the following:

Raise DTR -- A signaling method that enables access to the network by preprogramming the destination phone numbers into the dial device. Raise DTR signaling works with any of these interfaces: X.21, V.35, RS-232, and RS-422.

V.25bis -- A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Using V.25bis, the dial device can support dial connections to multiple destinations. V.25bis signaling works with any of these interfaces: X.21, V.35, RS-232, and RS-422.

Hayes -- A signaling method that enables access to the network by passing the destination phone numbers from the router to the dial device. Hayes signaling is for asynchronous PPP and works with RS-422 and V.34 interfaces. To use Hayes as the line media type, you must also specify a modem initialization string. The router sends this string to the modem to initiate a call.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.54

Parameter: Cable Type

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **COM** Connector > Choose Wan Serial Interface Type > **OK** > Sync Line Media Type

Default: RS232

Options: NULL │ RS232 │ RS422 │ V35 │ X21

Function: Indicates the physical interface type supported by the attached dial device. This parameter is for synchronous interfaces only.

Instructions: Select the option that corresponds to the interface type supported by the attached dial device.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.83

Parameter: Priority

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **COM** Connector > Choose Wan Serial Interface Type > **OK** > Sync or Async Line Media Type

Default: 1

Options: 1 to 50

Function: Prioritizes a group of lines in the same pool. For example, the router uses a line of priority 1 before it uses a line of priority 2.

For dial backup and bandwidth-on-demand pools, lines can reside across slots, but when you set this parameter, it affects only lines on the same slot. For example, if the backup pool has two lines in slot 3 and three lines in slot 4, the router sets a priority between the lines in slot 3, then sets a priority between the lines in slot 4. For bandwidth-on-demand, the router prioritizes lines in the preferred slot, then the reserved slot, and finally, the local slot.

Instructions: Assign a number to each line in the pool. The lower the number, the higher the priority. For pools that combine modem and ISDN lines, coordinate the priority assignments for this interface with those you set using the Pool Channel Priority parameter for the ISDN interface.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.97

External Modem Parameters

The Sync, Async, and Async Hayes Modem interface windows contain the modem configuration parameters. Figure A-5 shows an example.

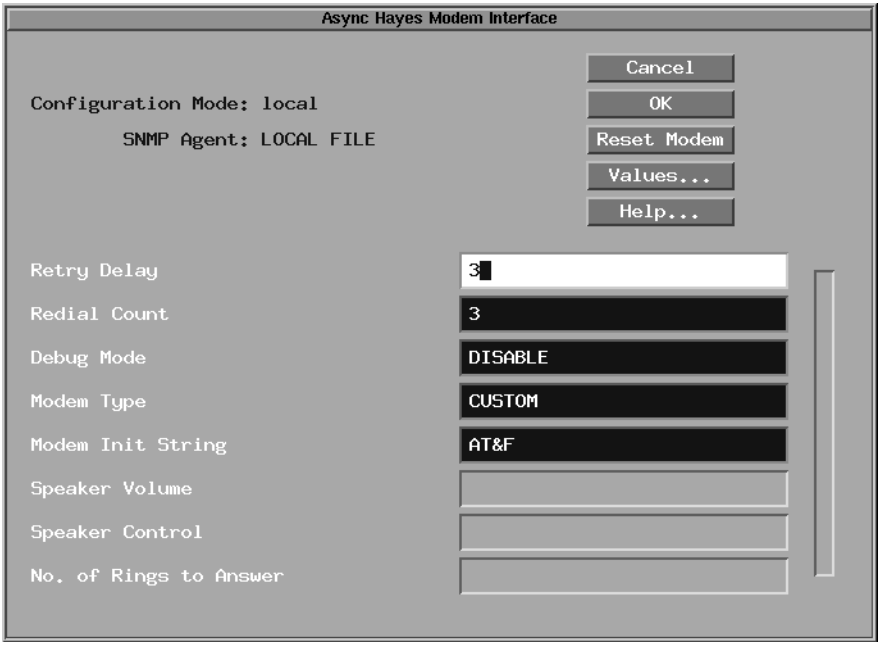

Figure A-5. Async Hayes Modem Interface Window

The parameter descriptions follow.

Parameter: **Retry Delay**

Path: **COM** Connector > **Edit Modem** > Sync/Async Modem Interface or Async Hayes Modem Interface

Default: 3 seconds

Options: 0 to infinity

Function: Specifies the number of seconds the router waits between attempts to reestablish the connection.

Instructions: Enter the number of seconds you want the router to wait between retry attempts.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.1.1.10

Parameter: **Redial Count**

Path: **COM** Connector > **Edit Modem** > Sync/Async Modem Interface or Async Hayes Modem Interface

Default: 3

Options: 1 to 10

Function: Specifies the maximum number of times that the router can attempt to connect to a dial-up line before it is disconnected.

Instructions: Select a number between 1 and 10, inclusive.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.1.1.16

Parameter: **Ring Indicator**

Path: **COM** Connector > **Edit Modem** > Sync/Async Modem Interface

Default: Enable

Options: Enable │ Disable

Function: Enables or disables the Ring Indicator (RI) signal for Raise DTR signaling.

Instructions: If the dial-on-demand line is configured to use Raise DTR, and you have a Series 5 router running 7.60 software, set this parameter to Disable. Hardware versions earlier than 7.60 do not support RI. Otherwise, accept the default, Enable.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.1.1.28

Parameter: **Debug Mode**

Path: **COM** Connector > **Edit Modem** > Sync/Async Modem Interface or Async Hayes Modem Interface

Default: Disable

Options: Enable | Disable

Function: Allows you to print debug log messages concerning the V.25bis, Raise DTR, or Hayes connection setup.

Instructions: Select Enable if you want to see the debug log messages. If not, accept the default, Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.1.1.29

Parameter: **Modem Type**

Path: **COM** Connector > **Edit Modem** > Async Hayes Modem Interface

Default: Custom

Options: List of supported modems. Click on Values to see the list.

Function: Lets you specify the modem you are using in your network.

Instructions: Select one of the modems from the list. If the modem you are using is not listed, select Custom and be sure to enter a modem initialization string. If you do not enter a string, Site Manager prompts you to do so.

MIB Object ID: 1.3.6.1.4.1.18.3.4.29.1.1.21

Parameter: **Modem Command String**

Path: **COM** Connector > **Edit Modem** > Sync/Async Modem Interface or Async Line Media Type

OR

Dialup > Pools > Demand/Backup/Bandwidth on Demand Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **COM** Connector > Choose Wan Serial Interface Type > **OK** > Sync or Async Line Media Type

Default: None

Options: Any valid modem command string (Raise DTR and V.25bis only).

Function: Enables you to test and modify the configuration of your modem. For example, if you want to change the speed of your modem, you can enter a command string to do this. Also, if you are having trouble placing calls, enter a string to test whether the modem responds.

Instructions: Enter a command string that your modem supports.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.13.1.4

Parameter: **Modem Init String**

Path: **COM** Connector > **Edit Modem** > Async Hayes Modem Interface

Default: AT& F

Options: An AT modem command string, which is an ASCII text string from 3 to 34 characters.

Function: For asynchronous interfaces only, this parameter specifies the modem initialization string the router sends to the modem. This command string takes precedence over factory default commands.

Instructions: Enter an AT command string that the modem should use to make calls. You must enter a value for this parameter if you selected Custom as the modem type. If you fail to enter a value, Site Manager prompts you to do so. Appendix E provides a summary of AT commands for the ARN. Refer to the manual for your modem for valid AT commands. Entering an invalid command may disable the modem. If the modem does not initialize, you may need to change the asynchronous baud rate. To do this, click on the COM connector and select Edit Line. Modify the value of the asynchronous baud rate.

MIB Object ID: 1.3.6.1.4.1.18.3.4.29.1.1.9

Parameter: **Speaker Volume**

Path: **COM** Connector > **Edit Modem** > Async Hayes Modem Interface

Default: Medium

Options: Low | Medium | High

Function: Sets the volume of the modem speaker. This parameter is available only if you select a modem from the list that Site Manager provides.

Instructions: Set the volume to Low, Medium, or High.

MIB Object ID: Not applicable

Parameter: **Speaker Control**

Path: **COM** Connector > **Edit Modem** > Async Hayes Modem Interface

Default: On For Call

Options: Off | On For Call | Always On | On For Answer

Function: Controls the modem speaker. This parameter is available only if you select a modem from the list that Site Manager provides.

Instructions: Select one of the following:

Off -- Turns the speaker off entirely

On For Call -- Turns the speaker on only when a call is established, and turns it off when the modem is transmitting data

Always On -- Keeps the modem speaker on at all times

On For Answer -- Turns the speaker on only when the modem is answering a call, and turns it off when the modem is transmitting data

MIB Object ID: Not applicable

Parameter:	**No. of Rings to Answer**
Path:	**COM** Connector > **Edit Modem** > Async Hayes Modem Interface
Default:	0
Options:	0 to 255
Function:	Determines the number of rings the router allows to connect to the modem. This parameter is available only if you select a modem from the list that Site Manager provides.
Instructions:	Enter an integer indicating the number of rings the router allows. For some modems, the modem may not answer after one ring, so you may want to set this value for two rings or more.
MIB Object ID:	Not applicable

V.34 Modem Parameters

These parameters are available only for the ARN using the V.34 Modem Adapter Module.

Parameter: Expert Config

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: Disabled

Options: Enabled | Disabled

Function: Enables or disables configuration of the Modem Config String parameter.

Instructions: To use only the factory default configuration, leave this set to Disabled. Set to Enabled to enter an AT command string in the Modem Config String field.

MIB Object ID: Not applicable

Parameter: Modem Config String

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: None

Options: An ASCII text string of 3 to 34 characters.

Function: Specifies a modem initialization string to be sent to the modem *after* the default, factory-configured command string. Commands in this string take precedence over commands in the factory default string (AT&M2&Q2&D0&S1&R0S0=0M1L2T).

Instructions: Enter an AT command string. Refer to Appendix E for a list of AT commands.

Note that entering an invalid command string could disable the modem. Site Manager can verify AT command string changes only when in dynamic mode.

MIB Object ID: 1.3.6.1.4.1.18.3.4.29.1.1.9

Parameter: **Modem Factory Defaults**

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: Enabled

Options: Enabled │ Disabled

Function: Specifies whether exclusive use of the factory default modem initialization string is enabled or disabled. When enabled, the router sends only the default string (ATT&d0&k3&X0S0=2S2=43) to the modem. When disabled, the router sends a user-specified initialization string (set in the Modem Config String parameter) after sending the default string. Commands in the user-specified string take precedence over the factory default command string.

Instructions: Enable or disable the exclusive use of the factory default modem initialization string.

MIB Object ID: 1.3.6.1.4.1.18.3.4.29.1.1.8

Parameter: **Originate/Answer**

Path: Configuration Manager > **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: Originate

Options: Originate │ Answer

Function: Determines whether the modem answers or originates calls.

Instructions: Set the modem to answer or originate calls.

MIB Object ID: Not applicable

Parameter: **Phone Number**

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: None

Options: An ASCII text string.

Function: Specifies the number to dial for calls that the modem originates.

Instructions: Enter a complete dial-out phone number, including applicable country and area codes. Valid dial modifiers are the comma, exclamation point, ampersand (&), hyphen, and parenthesis.

MIB Object ID: 1.3.6.1.4.1.18.3.4.29.1.1.18

Parameter: **Speaker Volume**

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: Medium

Options: Low │ Medium │ High

Function: Sets the volume of the modem speaker or disables the speaker.

Instructions: Turn the modem speaker off or set the volume to Low, Medium, or High.

MIB Object ID: Not applicable

Parameter: **Speaker Control**

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: On For Call

Options: Off │ On For Call │ Always On │ On For Answer

Function: Controls the modem speaker.

Instructions: Select one of the following:

Off -- Turns the speaker off entirely

On For Call -- Turns the speaker on only when a call is established, and turns it off when the modem is transmitting data

Always On -- Keeps the modem speaker on at all times

On For Answering -- Turns the speaker on only when the modem is answering a call, and turns it off when the modem is transmitting data

MIB Object ID: Not applicable

Parameter: **Set Pulse/Tone Dial Default**

Path: **COM** Connector > **Edit Modem** > Edit V.34 Modem Interface Parameters

Default: Tone

Options: Pulse │ Tone

Function: Selects pulse or tone signals for the modem.

Instructions: Select Pulse only if your telephone line does not support tone dialing.

MIB Object ID: Not applicable

Port Application Mode Parameters

The Port Application window contains the Port Application Mode parameter Figure A-6 is the window for BRI interfaces. The PRI window is similar.

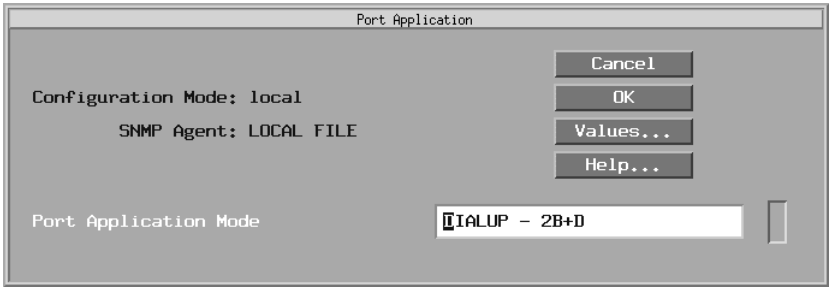

Figure A-6. Port Application Window

The parameter descriptions follow.

PRI Port Application Mode Parameter

Parameter:	**Port Application Mode**
Path:	**MCT1 or MCE1 Connector** > Port Application
Default:	NonPRI
Options:	NonPRI | PRI
Function:	Determines if this port is for PRI service. The NonPRI option indicates that this is a standard synchronous interface. The PRI option indicates that this is a PRI port.
Instructions:	If your application calls for PRI, select PRI. Otherwise, accept the default.
MIB Object ID:	1.3.6.1.4.1.18.3.4.9.3.1.16

BRI Port Application Mode Parameter

Parameter: **Port Application Mode**

Path: Configuration Manager > **ISDN Connector** > Port Application

Default: Dialup – 2B+D

Options: Dialup – 2B+D │ Dialup – 1B+D │ Dialup – Floating B │ Leased – 2X64K │ Leased – 1X64K │ Leased – 128K

Function: Determines how the BRI service operates. The options are as follows:

Dialup – 2B+D: Specifies that this is an ISDN switched line that provides two B channels, and call setup occurs between the router and an ISDN switch.

Dialup – 1B+D: Specifies that this is an ISDN switched line that provides only one B channel, and call setup occurs between the router and an ISDN switch. Use this option when you do not need to use two B channels.

Dialup – Floating B: Only for AN, ANH, and ARN routers. Specifies that although this is an ISDN switched line providing two B channels, the software makes the necessary adjustments if only one channel is in use. Use this option if you can purchase only 2B + D service, but only want to use one B channel, or your application requires two synchronous ports and only one B channel.

Leased – 2X64K: Specifies that this line provides two B channels that are always available. No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).

Leased – 1X64K: Specifies that this line provides one B channel that is always available. No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).

Leased 128K: Specifies that this line provides one B channel that is always available. (The extra bandwidth of the 128 Kb/s channel is equivalent to having two B channels of 64 Kb/s.) No call setup occurs with an ISDN switch. Instead, the switch has a defined point-to-point connection between two ISDN end points (Germany and Japan only).

Instructions: If you have a dial-up application, choose one of the dial-up options. For networks in Germany and Japan, if you want to have the dial-up line up at all times and your ISDN switch can support permanent connections, select one of the leased options.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.34

ISDN Switch Parameters

The ISDN Switch Configuration window (Figure A-7) contains the switch parameters.

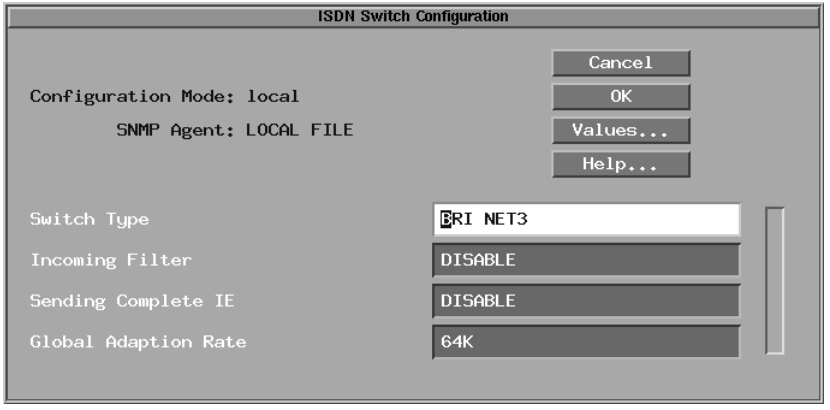

Figure A-7. ISDN Switch Configuration Window

Parameter: Switch Type

Path: Dialup > Demand/Backup/Bandwidth On Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth On Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Switch Configuration

Default: BRI NET3 | PRI Net5

Options: BRI NET3 | BRI SWISSNET3 | BRI 5ESS | BRI DMS100 | BRI KDD | BRI NTT | BRI TS013 | BRI NI1 | PRI 5ESS | PRI DMS100 | PRI 4ESS | PRI KDD | PRI NTT | PRI Net5 | PRI TS014

Site Manager displays only those switch options for the interface you are configuring. For example, if you are setting up BRI service, you will see only BRI switch types when you click on Values. In addition, if the router is communicating with a Version 8.10 router, you will only see BRI switch types that support Version 8.10 software.

Function: Specifies the type of ISDN switch to which you are connecting.

Instructions: Choose the appropriate ISDN switch. Refer to Table A-3. On the ASN, you cannot configure two different switch types on the same slot.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.6.1.3

Table A-3. Switch Types by Country

Country	BRI Switch Types	PRI Switch Types
Austria Belgium Denmark France Germany Italy Netherlands Norway Spain Sweden United Kingdom	BRI NET3	PRI NET 5
Switzerland	BRI SWISSNET3	PRI NET 5
United States	BRI 5ESS, BRI NI1, BRI DMS100	PRI 4ESS, PRI 5ESS, PRI DMS 100
Canada	BRI NI1, BRI DMS100	PRI DMS100
Japan	BRI KDD, BRI NTT	PRI KDD, PRI NTT
Australia	BRI TS013	PRI TS014
Finland Greece Iceland Ireland Luxembourg Portugal		PRI NET 5

Parameter: Incoming Filter

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Switch Configuration

Default: Disable

Options: Enable │ Disable

Function: The incoming filter enables you to use the security feature caller ID. It compares the phone number of the calling party with the phone numbers you entered in the incoming phone list, described in Chapter 15. You must purchase caller ID service so that the provider includes the calling party's number in the call setup message.

Instructions: Enable this parameter if you want the router to filter all incoming calls based on the calling party's number. Disable this parameter if the router should not screen calls or if the switch does not include the calling party's number in the incoming call.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.6.1.5

Parameter: Sending Complete IE

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Switch Configuration

Default: Disable

Options: Enable │ Disable

Function: Instructs the router to include the sending complete information element (IE) in the outgoing call setup message to the switch. The sending complete IE is included in the call setup message to indicate that the setup is complete and no other setup information will follow. There are some switches that rely on this information during call setup.

Instructions: Select Enable if you want to include this IE in the call setup message, and if your ISDN switch supports this IE. By including the IE in the call setup message, call setup times may be faster. If your ISDN switch does not support this IE, accept the default, Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.6.1.8

Parameter: **Global Adaption Rate**

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Switch Configuration

Default: 64K

Options: 64K │ 56K

Function: In accordance with the ITU-T V.110 standard, this parameter enables the router to send and receive data transmitting at a rate of 56 Kb/s and adapt it for transmission over a 64 Kb/s line.

Instructions: Specify the rate that the router sends and receives calls over a B channel. Ensure that the rate is compatible with the network connections to the destination device. Ask your provider if you are unsure.

MIB Object ID: I 1.3.6.1.4.1.18.3.5.9.8.6.1.9

Parameter: **Global X.25 over ISDN-D Channel**

Path: Dialup > Edit Switch Parameters > ISDN Configured Switches

Default: Disable

Options: Enable │ Disable

Function: Globally enables or disables X.25 service over the D channel for a slot on the router.

Instructions: Site Manager automatically sets this parameter to Enable when you configure X.25 service over the D channel for a BRI line. Refer to page A-30 for the parameter that enables this feature for the BRI line.

Select Disable to disable this service for a slot.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.6.1.10

Pool Channel Count and Priority Parameters

The ISDN Logical Lines window (Figure A-8) contains the ISDN pool parameters.

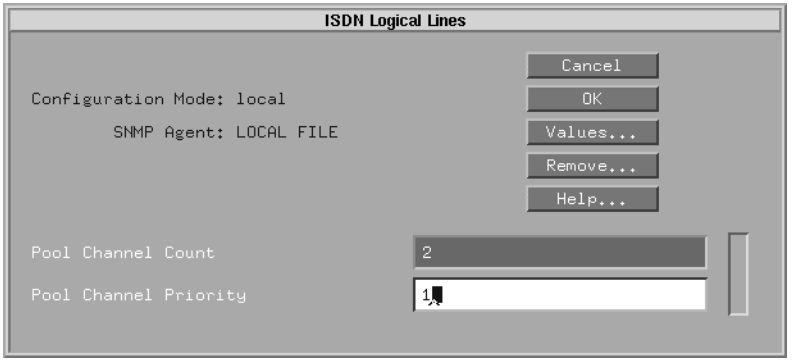

Figure A-8. ISDN Logical Lines Window

The parameter descriptions follows.

Parameter: Pool Channel Count

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Switch Configuration > **OK** > ISDN Logical Lines

OR

Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **select pool** > **Edit** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Logical Lines

Default: Available B channels

Options: 1 to 2 (BRI) │ 1 to 23 (PRI – MCT1) │ 1 to 30 (PRI – MCE1)

The channel-count range for PRI depends on the number of B channels you selected in the Timeslots window and the number out of this total that you assign to each pool. For example, if you have a total of 20 B channels, and five of those channels are configured for Pool 1, the range of this parameter for Pool 2 is 1 to 15 channels. Five of the original 20 channels are not available because they are used by Pool 1.

Function: Determines the number of B channels in the line pool.

Instructions: Enter the number of B channels that you want in the line pool.

If you are configuring a multirate call, be sure that the value for this parameter is not less than the maximum value that you can set for the Aggregate Bandwidth parameter, which you configure when you set up an outgoing phone list. For example, if the aggregate bandwidth is 256 Kb/s, the value for this parameter should be 4.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.11.1.5

Parameter: Pool Channel Priority

Path: Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **Add** > Demand/Backup/Bandwidth on Demand Pool Configuration > **OK** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Configured Switches > **OK** > ISDN Logical Lines

OR

Dialup > Demand/Backup/Bandwidth on Demand Pools > Pools > **select pool** > **Edit** > Lines Definition > **ISDN/MCT1/MCE1** Connector > ISDN Logical Lines

Default: 1

Options: 1 to 50

Function: Prioritizes a group of lines in a pool. For example, the router uses a line of priority 1 before it uses a line of priority 2.

For dial backup and bandwidth-on-demand pools, lines can reside across slots, but when you set this parameter, it affects only lines on the same slot. For example, if the backup pool has two lines in slot 3 and three lines in slot 4, the router sets a priority for the lines in slot 3, then sets a priority for the lines in slot 4. For the bandwidth pool, the router prioritizes lines in the preferred slot, then the reserved slot, and finally, the local slot.

Instructions: Assign a number to each line in the pool. The lower the number, the higher the priority. If you have a pool that combines modem and ISDN lines, you should coordinate the priority assignments for the ISDN lines with those you set using the Priority parameter for the modem lines.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.11.1.6

BRI Configuration Parameters

The BRI Interface Configuration window (Figure A-9) contains the BRI interface parameters for signaling over the D channel.

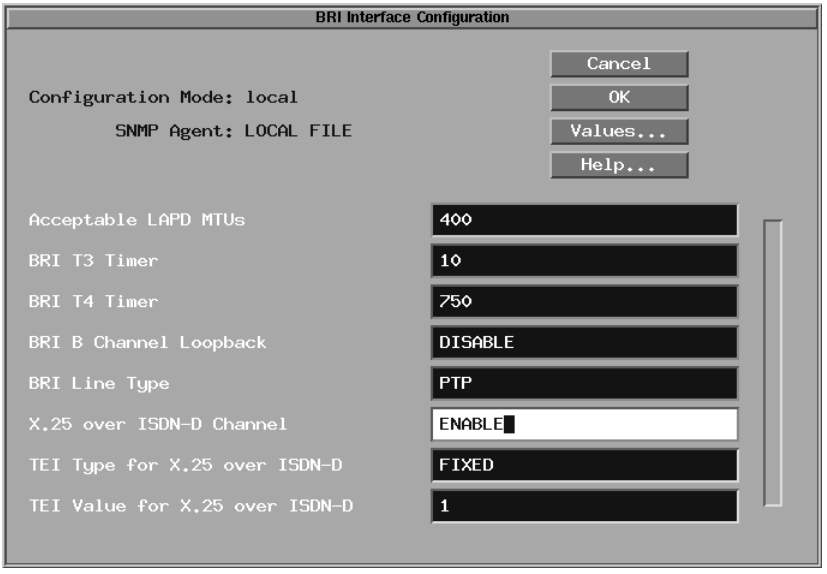

Figure A-9. BRI Interface Configuration Window

The parameter descriptions follow.

Parameter: Acceptable LAPD MTUs

Path: Configuration Manager **> ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: 400 bytes

Options: 3 to 1024 bytes

Function: Specifies the maximum number of bytes per LAPD transmission unit.

Instructions: Enter a value for the maximum MTUs. We recommend that you accept the default, 400 bytes.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.12

Parameter: **BRI T3 Timer**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: 10 seconds

Options: 1 to 30 seconds

Function: Indicates the amount of time that the router has to try and activate the ISDN S/T or U interface (ARN only). The router starts this timer while the ISDN interface is deactivated and the router tries to activate it, for example, when the router wants to send data. During this period, the router sends INFO 1 frames across the ISDN interface until the network responds with a signal or the timer expires. This timer prevents the router from attempting to activate the ISDN interface interminably.

Instructions: Enter a time limit that is sufficient for the router to activate the ISDN S/T or U interface. This value should be greater than the time it would take to activate the ISDN interface under normal conditions. You may want to ask your ISDN provider for guidelines regarding the subscriber loop transmission, which might affect the value you enter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.14

Parameter: **BRI T4 Timer**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: 750 milliseconds

Options: 500 to 1000 milliseconds

Function: Indicates the amount of time the router waits for the line to recover from a deactivated state. This timer prevents brief, minor disturbances on a noisy line from forcing the router to deactivate the circuit. Instead, the router waits to see if the line recovers within the T4 timer period. This enables the router to suppress minor line problems from the upper-layer protocols.

Instructions: Enter a time limit that the router waits for the line to recover before it deactivates the circuit. If your line is noisy, enter the maximum time for the router to wait for the line to reactivate.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.15

Parameter: **BRI B Channel Loopback**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: Disable

Options: Enable │ Disable

Function: This parameter is for Layer 1 ISDN BRI conformance testing. It allows the external equipment to send data to the router over the B channels and loop it right back out the S/T or U interface (ARN only). The external equipment can verify its physical connection to the router.

Instructions: Select Enable if you want to run a loopback test between the network and the S/T or U interface on the router. Do not enable this parameter when the router is in normal operational mode.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.13

Parameter: **BRI Line Type**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: PTP

Options: PTP │ MTP

Function: Indicates whether you have a point-to-point (PTP) or multipoint (MTP) configuration on the BRI line.

Instructions: Enter the value of the type of line supplied by your ISDN provider. If you have a PTP line connected to a 5ESS switch, you do not have to configure SPIDs. (Refer to the SPID parameter on page A-92.)

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.33

Parameter: **X.25 over ISDN-D Channel**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: Disable

Options: Enable │ Disable

Function: Enables or disables X.25 service over the D channel for each BRI line.

Instructions: Select Enable to enable this feature. Otherwise, accept the default.

CAUTION: If you enable or disable this feature dynamically, the router disconnects all existing calls over the B channels as the ISDN software makes changes for the feature. Once the changes are complete, the software restarts and you can make calls again.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.39

Parameter: **TEI Type for X.25 over ISDN-D**

Path: **ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration

Default: Fixed

Options: Fixed │ Auto

Function: Specifies how you choose to configure the TEI value for the DTE. You can preassign the identifier value at the time you order ISDN service or the router can learn the value from the switch dynamically when you place a call and the line becomes active. Either way, the switch assigns this value. This parameter is available only if you enable X.25 over the D channel.

Instructions: Select Fixed to enter the identifier assigned by the switch before placing any calls. Select Auto so the router learns the identifier dynamically once the line is active.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.9.1.40

Parameter:	**TEI Value for X.25 over ISDN-D**
Path:	**ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration
Default:	1
Options:	0 to 63
Function:	Assigns a number to the X.25 DTE to identify it to the ISDN switch. This parameter is available only if you enable X.25 over the D channel for a fixed TEI type.
Instructions:	If you set the TEI type to Fixed, enter the TEI value that the switch provider assigned when you ordered ISDN service. The value must be in the range 0 to 63. If the TEI type is set to Auto, ignore this parameter.
MIB Object ID:	1.3.6.1.4.1.18.3.5.9.8.9.1.41

BRI Leased-Line Configuration Parameters

Parameter: **MTU**

Path: **ISDN Connector** > ISDN Leased Line B Channels or ISDN Leased Line

Default: 1600

Options: 3 to 4608

Function: Specifies the largest frame (Maximum Transmission Unit) that the router can transmit over the line.

Instructions: Set this parameter to a value appropriate for your network.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.96

Parameter: **Inter Frame Time Fill**

Path: **ISDN Connector** > ISDN Leased Line B Channels or ISDN Leased Line

Default: Default

Options: Default │ FORCEHDLCFLAGS │ FORCEIDLES

Function: The inter frame time fill (IFTF) indicates the signal pattern that the router transmits when there is no data going across a channel. If you set this parameter to Default, the pattern that the router transmits depends on the setting of the synchronous line parameter, Sync Media Type. If the Sync Media Type parameter is set to ISDNLEASED, the IFTF will be an idle signal. For all other Sync Media Type values, the IFTF will be HDLC flags.

If you select FORCEHDLCFLAGS or FORCEIDLES for this parameter, then the IFTF will be HDLC flags or idle signals respectively, regardless of the Sync Media Type.

Instructions: Select the IFTF pattern that the router should send when there is no data to transmit.

MIB Object ID: 1.3.6.1.4.1.18.3.4.5.1.96

Parameter:	**BRI T4 Timer**
Path:	**ISDN Connector** > ISDN Dialup > **Edit D Chan** > BRI Interface Configuration
Default:	750 milliseconds
Options:	500 to 1000 milliseconds
Function:	Indicates the amount of time the router waits for the line to recover from a deactivated state. This timer prevents brief, minor disturbances on a noisy line from forcing the router to deactivate the circuit. Instead, the router waits to see if the line recovers within the T4 timer period. This enables the router to suppress minor line problems from the upper-layer protocols.
Instructions:	Enter a time limit that the router waits for the line to recover before it deactivates the circuit. If your line is noisy, enter the maximum time for the router to wait for the line to reactivate.
MIB Object ID:	1.3.6.1.4.1.18.3.5.9.8.9.1.15

Demand Circuit Parameters (PPP and Frame Relay)

The PPP and frame relay demand circuit windows contain the demand circuit parameters. Figure A-10 shows the PPP Demand Circuits window. The frame relay window is similar.

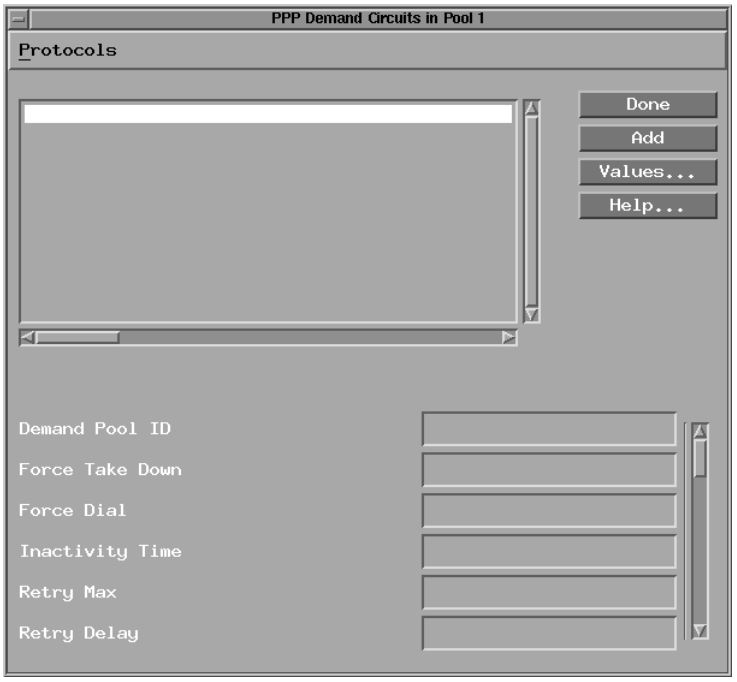

Figure A-10. PPP Demand Circuits Window

The parameter descriptions follow.

Parameter: Demand Pool ID

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: None

Options: 1 to 255

Function: Identifies the demand pool associated with the demand circuit.

Instructions: Enter the ID number of the configured demand pool that you want this circuit to use.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.6

Parameter: Force Take Down

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: Disable

Options: Enable │ Disable

Function: Forces the router to immediately terminate the demand circuit.

Instructions: Accept the default, Disable, or select Enable to force the router to terminate the demand circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.24

Parameter: Force Dial

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: Disable

Options: Enable │ Disable

Function: Forces the demand circuit connection to immediately activate.

Instructions: To force a demand circuit connection, select Enable, then reset it to Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.9

Parameter: **Inactivity Time**

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: 60 seconds

Options: 1 to 99,999,999 seconds

Function: Measures the data inactivity on the line. Specifically, it determines the number of seconds that can elapse *without* data activity before the router disconnects the line. Each time data passes through the router, the inactivity time resets.

NOTE: The router does not consider LQR, LCP, and periodic CHAP messages as data, so they do not reset the time.

This parameter and the Inactivity Mode parameter determine how inactivity is monitored. Once the router concludes that there is no data activity, it disconnects the line.

Instructions: Specify a time limit, between 1 and 99, 999,999 seconds, that the router waits before deactivating the switched connection.

If you want the connection to remain active at all times, enter 99,999,999. The connection remains active unless the network deactivates the connection. If the connection is deactivated, the router redials the same number when the next packet is ready for transmission. You can also manually force the router to establish a connection if a line is available.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.15

Parameter: **Retry Max**

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: 2

Options: 1 to 10

Function: Specifies the number of attempts that the router makes to establish the circuit. The router tries all of the phone numbers in the outgoing phone list for a given line. If no connection is made and there is still data to send, the router increments the retry count, then retries these numbers on the next line in the pool.

Instructions: Enter the number of times you want the router to try to establish the circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.25

Parameter: Retry Delay

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: 3 seconds

Options: 1 to 60 seconds

Function: Determines how long the router waits between each retry attempt before trying to reestablish the circuit.

Instructions: Enter the amount of time that you want the router to wait before trying the next line in the pool. The amount of time you choose depends on the time it typically takes the network to recover.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.27

Parameter: Connection Mode

Path: Dialup > Demand Circuits > Demand Pools > **PPP** > PPP

Default: Collision Master

Options: No Dial │ Collision Master │ Collision Slave

Function: Determines the role of each router when two routers try to establish a demand circuit with one another at the same time, resulting in a collision. Both routers in a demand configuration can initiate a call. If a collision occurs, each router refers to the value of this parameter to determine whether to initiate subsequent calls or whether to wait and receive calls.

Instructions: To avoid continual collisions, configure one router as Collision Master and the other as Collision Slave. After an initial collision, each router will then follow the role assigned by this parameter. To ensure that a router receives calls, but never initiates calls, enter No Dial.

If this circuit is part of an unnumbered demand circuit group, the router automatically sets this parameter to No Dial because a circuit in a demand circuit group cannot initiate a call.

If you are configuring a bandwidth pool for this circuit, and this router is the monitor router, you must select Collision Master or Collision Slave; do not use the No Dial option.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.28

Parameter: Auto Demand Termination

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: Disabled

Options: Enabled | Disabled

Function: For applications where there are two paths to the same destination, this parameter allows the router to automatically terminate a failed demand circuit and send the data over an alternative path to the destination. Note that the router does not terminate the circuit until it reaches the maximum number of connection attempts, which you specify in the Retry Max parameter.

Enable this parameter when the router continues to advertise a static route over a demand circuit, but cannot establish a connection over that circuit. The router terminates the demand circuit, which notifies the routing protocol that the static routes associated with this circuit are no longer active. The router then uses the alternative path.

Instructions: Select Enable if you have an alternative path to a remote destination, and you want to ensure that if the demand circuit fails, the router terminates the circuit and sends data over the other path.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.29

Parameter: Auto Demand Term. Reset

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: 60 minutes

Options: 1 to 999,999 minutes

Function: Specifies the amount of time, in minutes, that the router waits before reestablishing the demand circuit after an autodemand termination. After the router reestablishes the demand circuit, the protocols readvertise the static routes for this demand circuit.

Instructions: Specify an amount of time that allows the network to recover or that allows your network administrator to resolve the problem. You must enter a value for this parameter if you enabled the Auto Demand Termination parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.30

Parameter: Circuit Name

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: None

Options: Any valid demand circuit name.

Function: Identifies the name of the demand circuit.

Instructions: Site Manager supplies this name based on the available circuit names. To modify this parameter value, enter a new name, then click on Apply.

MIB Object ID: 1.3.6.1.4.1.18.3.3.2.3.1.3

Parameter: Dial Optimized Routing

Path: Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Default: Disabled

Options: Disabled | Enabled

Function: Enables dial-optimized routing for this interface.

Instructions: Select Enabled to exchange RIP or RIP/SAP updates only when a connection is active for data transmission or when the protocol makes an update request at the expiration of the Broadcast Timer (IP) or Update Interval (IPX). Routing updates alone cannot initiate connections. Accept the default, Disable, if you do not want to limit updates in this way.

If you enable or disable dial-optimized routing dynamically while your demand connection is active, the router deactivates the connection. If there is still data to send after the call is cleared, the router places another call using the new value for this parameter.

If you do not enable dial-optimized routing, you may want to limit routing updates using another method. Refer to Chapter 6 for more information about limiting broadcast traffic.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.47

Parameter:	**Routing Update Hold Time**
Path:	Dialup > Demand Circuits > Demand Pools > **FR Circuits** > FR Demand Circuits
Default:	0
Options:	0 to 600 seconds
Function:	Tells the router how long to wait before sending RIP or SAP updates across the Frame Relay demand circuit. This parameter works together with dial-optimized routing.
Instructions:	If you enable dial-optimized routing, enter the number of seconds that the router should wait after placing a call to send routing updates. The time interval you specify should be long enough so that the connection to the destination site activates, not just the connection to the frame relay switch. If you send routing updates before the connection to the destination is active, routing updates may not reach the destination.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.57

Standby Circuit Parameters (PPP Demand Circuits Only)

The standby circuit parameters, which define standby demand circuits, are in the PPP Demand Circuits window (Figure A-10 on page A-34).

Parameter: Standby Mode

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: Demand Normal

Options: Demand Normal | Standby | Hot Standby

Function: Indicates whether this circuit operates as a demand circuit or a standby circuit.

Instructions: Accept the default if you want this circuit to operate as a demand circuit. Select Hot Standby if you want this circuit to back up a failed primary circuit. Select Standby to act as a standby circuit for incoming calls.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.50

Parameter: Standby Failback Mode

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: None

Options: None | Automatic | Manual

Function: Controls the failback from the hot standby circuit to the primary circuit. This option is available only if the Standby Mode parameter is Hot Standby.

Instructions: Select one of the following options:

Automatic -- Automatically deactivates the hot standby circuit and sends data traffic back across the primary circuit when it recovers. This option takes precedence over any Time of Day schedule.

Manual -- Controls the primary and hot standby circuits by operator intervention. To return traffic to the primary circuit you manually deactivate the standby circuit. This option overrides the Time of Day schedule.

None -- Instructs the router to rely exclusively on the Time of Day schedule for primary and standby circuit operation and to ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.51

Parameter: Manual Standby Action

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: No Action

Options: No Action │ Activate │ Deactivate

Function: Allows you to manually control the standby circuit.

Instructions: Select Activate to activate a standby or hot standby circuit. Select Deactivate to bring down a standby circuit. Accept the default, No Action, if you do not want to manually activate a standby circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.52

Parameter: Standby Primary Circuit

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: None

Options: Circuit number of a leased line.

Function: Specifies the primary circuit that the hot standby circuit backs up. This option is available only if the Standby Mode parameter is Hot Standby.

Instructions: Click on the Values button. Site Manager displays a list of primary and bandwidth-on-demand circuits. Highlight the circuit for which standby service should be provided, then click on OK.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.4

Callback Parameters (PPP Demand Circuits Only)

The callback parameters, which define the callback feature, are in the PPP Demand Circuits window (Figure A-10 on page A-34).

Parameter: Callback Mode

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: Inactive

Options: Inactive │ Server │ Client │ Server Call ID │ Client One Charge │ Server One Charge │ Server One Charge Call ID

Note the following guidelines:

- If the router is set to Server, Client, or Server Call ID, the router performs CHAP or PAP authentication when it receives a call.
- The one-charge modes ensure that only the server side of the callback connection incurs phone charges. When you choose any of these options, the server refuses the call from the client, eliminating charges for the client's initial call, but charging the server for its return calls to the client.
- To use any of the one-charge modes, each remote site must have a unique phone number. The server must be able to identify a single circuit for each phone number that it calls back.
- If you want to reduce your configuration work and you can purchase caller ID service, select the modes that use Call ID. These modes do not require an outgoing phone list to place a call; they rely only on the phone number in the call setup message.
- If you cannot use caller ID or the phone number in the call setup message is not sufficient to place an outgoing call (for example, you have to dial 9 to get an outside line), do not select a Call ID mode.

Function: Determines the role of the router in relation to its peer router, and how the router identifies which phone number to call back.

Instructions: Select one of the following options:

Inactive -- Disables the callback feature for this circuit.

Server -- Designates the router as the callback server. The server receives a call from the client. It authenticates the caller, disconnects the call, and returns the call using a phone number in the outgoing phone list.

(continued)

Instructions: **Client** -- Designates the router as the callback client. Use this mode when the other end of the connection uses Server or Server Call ID. The client initiates a call to the server, then waits for the server to return the call. Once it receives the return call, the client authenticates the call before accepting it.

Server Call ID (ISDN connections only) -- Designates the router as the callback server using caller ID. The server receives a call from the client, authenticates the call, and disconnects it. The server then returns the call using the phone number in the original call's setup message.

Client One Charge (ISDN connections only) -- Designates the router as the callback client. Also indicates that there will be no charge for the initial call to the server. Use this mode when the other end of the connection uses Server One Charge or Server Once Charge Call ID. The client places a call to the server, expecting the call to fail. The server refuses the call, which eliminates any phone charge for the client. The client then waits for a return call from the server. This option saves the client the cost of the initial call.

Server One Charge (ISDN connections only) -- Designates the router as the callback server. Also indicates that only the server will be charged for the return call to the client. The server receives a call from the client. The server, using incoming call filtering, verifies that the client is an authorized caller by matching the client's phone number with a phone number and circuit number in the incoming phone list. If the server finds a matching entry, it refuses the call. By refusing the call, the server eliminates any phone charges for the client. The server then returns the call using a phone number in its outgoing phone list for the matching circuit.

Server One Charge Call ID (ISDN connections only) -- Designates the router as the callback server using caller ID and indicates that only the server will be charged for the return call to the client. The server receives a call from the client. The server, using incoming call filtering, verifies that the client is an authorized caller by matching the client's phone number with a phone number and circuit number in the incoming phone list. If the server finds a matching entry, it refuses the call. By refusing the call, the server eliminates any phone charges for the client. The server then returns the call using the phone number in the original call's setup message.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.53

Parameter: **Callback Server Delay Time (sec)**

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: 0

Options: 0 to 1800 seconds

Function: Specifies the amount of time the server waits before calling back the client. Delaying the call allows time for the client's modem to disconnect or for its ISDN connection to stop retrying the original call.

This parameter is available only if the Callback Mode parameter is set to one of the server options.

Instructions: Enter the amount of time you want the server to wait before calling the client back. If you are using a modem, enter a value greater than 6 seconds.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.54

Parameter: **Callback Client Delay Time (sec)**

Path: Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Default: 5 seconds

Options: 0 to 1800 seconds

Function: Specifies the amount of time the client waits for a return call from the server. During this time, the client will not place an outgoing call to any other destination. The delay gives the server time to return the initial call.

This parameter is available only if the Callback Mode parameter is set to one of the client options.

Instructions: Enter the amount of time the client should wait for the server to call. This value must be greater than the Callback Server Delay Time. If you are dialing through a modem, we recommend that you set this value greater than 45 seconds.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.55

Authentication Protocol Parameters

The authentication parameters are the same for demand, backup, and bandwidth circuits, and they are located in each service's circuit configuration window.

Parameter: **CHAP Local Name**

Path: **Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Backup Circuits: Dialup > Backup Circuits > PPP > Primary Circuit Definition

Bandwidth Circuits: Dialup > Bandwidth On Demand Circuit > Bandwidth On Demand Circuit Definition

Default: None

Options: Any text string; maximum of 20 characters

Function: This name is part of the outbound call and it informs remote peer routers of the local router's identity.

For bandwidth-on-demand circuits, this parameter is only available if the Bandwidth Mode parameter is set to Monitor. The router uses the CHAP name when it activates the secondary line.

Instructions: If you configure CHAP as the authentication protocol, specify a name for router identification. If not, ignore this parameter. Do not configure this parameter for a demand circuit group.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.31

Parameter: **CHAP Secret**

Path: **Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits

Backup Circuits: Dialup > Backup Circuits > PPP > Primary Circuit Definition

Bandwidth Circuits: Dialup > Bandwidth On Demand Circuit > Bandwidth On Demand Circuit Definition

Default: Unsecured

Options: Any text string; maximum of 20 characters

Function: Specifies the CHAP Secret that you assign to this interface. The CHAP secret is for identification and security purposes, and must be the same on both sides of the link.

When one router places a call to another router, an authentication process takes place. During this phase, the routers send challenge packets back and forth that include the CHAP secret. Both routers on a link must have the same CHAP secret to correctly calculate responses to the challenges.

For bandwidth-on-demand circuits, this parameter is only configurable if the bandwidth mode is Monitor. The router uses the CHAP secret when it brings up the secondary line.

Instructions: If you configure CHAP as the authentication protocol, specify the CHAP secret. If not, ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.32

Parameter:	**PAP Local ID**
Path:	**Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits **Backup Circuits:** Dialup > Backup Circuits > PPP > Primary Circuit Definition **Bandwidth Circuits:** Dialup > Bandwidth On Demand Circuit > Bandwidth On Demand Circuit Definition
Default:	None
Options:	Any text string; maximum of 25 characters
Function:	Specifies the PAP ID that you assign to this interface. It identifies the calling router to the called router. During the authentication phase, all Password Authenticate-Request messages that the calling router sends to the called router must include the correct PAP ID or the called router sends an Authenticate-Negative Acknowledgment (Authenticate-NAK) and does not bring up the connection. For bandwidth-on-demand circuits, this parameter is only configurable if the Bandwidth Mode parameter is set to Monitor.
Instructions:	If you are using PAP as the authentication protocol, specify a unique PAP ID for this circuit. If not, ignore this parameter.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.37

Parameter:	**PAP Password**
Path:	**Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits **Backup Circuits:** Dialup > Backup Circuits > PPP > Primary Circuit Definition **Bandwidth Circuits:** Dialup > Bandwidth On Demand Circuit > Bandwidth On Demand Circuit Definition
Default:	Unsecured
Options:	Any text string; maximum of 25 characters
Function:	Specifies the PAP password that you assign to this interface. During the interface's authentication phase, all Password Authenticate-Request messages that the calling router sends to the called router must include the correct PAP password or the called router sends an Authenticate-Negative Acknowledgment (Authenticate-NAK) and does not bring up the connection. For bandwidth-on-demand circuits, this parameter is only configurable if the Bandwidth Mode parameter is set to Monitor.
Instructions:	If you are using PAP as the authentication protocol, specify a unique PAP password for this circuit. If not, ignore this parameter.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.38

Parameter:	**Outbound Authentication**
Path:	**Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP Circuits** > PPP Demand Circuits **Backup Circuits:** Dialup > Backup Circuits > PPP > Primary Circuit Definition **Bandwidth Circuits:** Dialup > Bandwidth On Demand Circuit > Bandwidth On Demand Circuit Definition
Default:	Enable
Options:	Enable | Disable
Function:	Specifies whether the router performs authentication when it places an outbound call. Disabling outbound authentication improves interoperability with devices that do not perform two-way authentication or support CHAP.
Instructions:	Accept the default, Enable, if you want to use two-way authentication, that is, both sides of the connection will authenticate the other's identity. Select Disable to use one-way authentication, which means that only the router receiving the call performs authentication. If you disable this parameter to use one-way authentication, you must enable the PPP Fallback parameter, which is part of the PPP interface configuration. Refer to *Configuring PPP Services* for information about PPP Fallback.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.48

Circuit Duration Parameters (Demand and Dial Backup)

The circuit duration parameters determine how long the connection remains active, not the circuit's availability. These parameters are located in each service's circuit configuration window.

Parameter: **Maximum Up Time**

Path: **Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition

Default: 60 minutes

Options: 1 to 999,999 minutes

Function: Specifies the maximum duration of a call for a continuous period of time. This parameter value ensures that the connection is not up longer than necessary.

For example, you may configure the circuit's availability (via the Start and End time parameters) from 9:00 a.m. to 5:00 p.m. Then configure this parameter for 60 minutes. If the connection comes up at 10:00 a.m., the router keeps the circuit active until 11:00 a.m. Then, the router invokes the Max UpTime Termination parameter to deactivate the circuit.

Instructions: Enter the maximum active time for a call during a continuous period of time.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.10

Parameter: **Max UpTime Termination**

Path: **Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition

Default: Disabled

Options: Enabled │ Disabled

Function: Automatically deactivates the circuit if the call reaches the maximum time that you specify in the Maximum Up Time parameter. If the router receives data after the circuit is down, the router does not establish a demand connection.

Instructions: Enter Enable if you want the circuit to terminate upon reaching the maximum time limit for the call.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.33

Parameter: **UpTime Term. Reset**

Path: **Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition

Default: 60 minutes

Options: 1 to 999,999 minutes

Function: Determines the amount of time the router waits before making the demand circuit available again after an uptime termination (Max UpTime Termination parameter). The circuit is not established at this point, but the next time the router receives data, the circuit will be available and the router can activate it.

The router invokes this timer only after an invoking the UpTime Termination parameter.

Instructions: Enter the time period that the router should wait before making the circuit available again. You must enter a value for this parameter if you configured the Max UpTime Termination parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.34

Parameter:	**Minimum Call Duration**
Path:	**Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits
Default:	60 seconds
Options:	10 to 2,147,483,647
Function:	Specifies the minimum amount of time that the connection remains active regardless of whether there is data traffic.
Instructions:	Enter the minimum amount of time the connection should remain active. For dial-optimized routing circuits, this timer should allow enough time to send all routing updates to the remote nodes in the network.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.45

Parameter:	**Inactivity Mode**
Path:	**Demand Circuits:** Dialup > Demand Circuits > Demand Pools > **PPP or FR Circuits** > PPP or FR Demand Circuits
Default:	Both Directions
Options:	Both Directions | Transmit Only | Receive Only | Either Direction
Function:	Measures data inactivity for a specific direction across a line. Specifically, it lets you decide in which direction the router determines inactivity. Together with the Inactivity Time parameter, this parameter informs the router to deactivate the connection if there is no data going in the specified direction. **NOTE:** The router does not consider the following as data, so it does not consider them when determining inactivity: PPP's LQR, LCP, periodic CHAP messages, Frame Relay DLCMI, and other signaling messages.
Instructions:	Select the option that best suits your application: **Both Directions** -- If the router does not receive data and does not transmit data, it terminates the connection. The inactivity has to be in both directions. **Transmit Only** -- If there is no data to transmit, the router terminates the connection. The router disregards data it receives. Select this option if you are using dial-optimized routing for IPX. **Receive Only** -- If the router does not receive data, it terminates the connection. The router disregards data it transmits. **Either Direction** -- If the router does not receive or transmit data, it terminates the connection. The inactivity can be in either direction.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.46

Circuit Schedule Parameters (Demand and Dial Backup)

The circuit schedule parameters determine the dial circuit's availability. These parameters are located in each service's Circuit Time of Day Schedule window. Figure A-11 shows an example of this window.

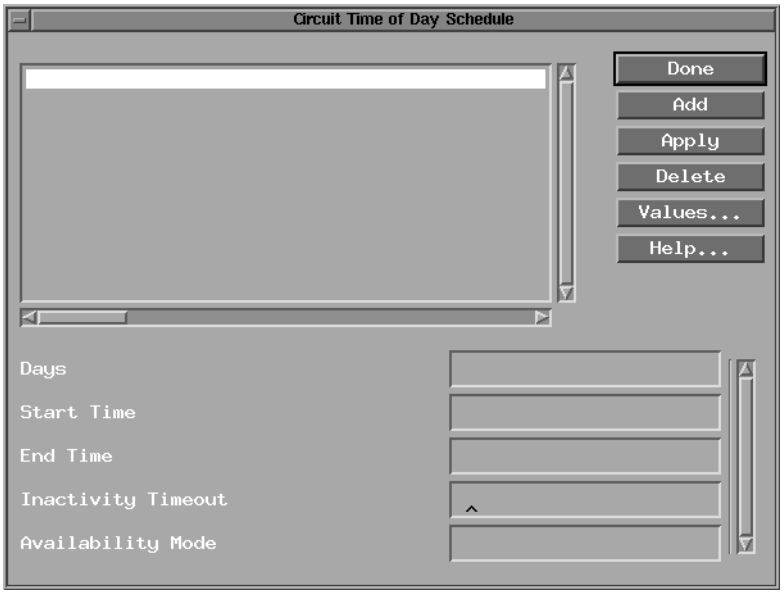

Figure A-11. Circuit Time of Day Schedule Window

The parameter descriptions follow.

Parameter: Days

Path: **Demand Circuits:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Schedule** > Circuit Time of Day Schedule > **Add >** Circuit Time of Day Schedule

Default: Weekday

Options: Monday through Sunday │ Weekday │ Weekend

Function: Specifies the days that this circuit should be available. The router uses this parameter together with the Start Time and End Time parameters to create a time period that the circuit can be available.

Instructions: Enter a specific day of the week; enter Weekday for the entire week; enter Weekend for the Saturday and Sunday. Note that individual days of the week take precedence over the Weekday option.

For example, the router will provide a circuit scheduled for Monday between 9 a.m. and 11 a.m. before it provides a circuit scheduled for a weekday between 8 a.m. and noon.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.11.1.4

Parameter: Start Time

Path: **Demand Circuits:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition> **Schedule** > Circuit Time of Day Schedule > **Add >** Circuit Time of Day Schedule

Default: 0

Options: 0 to 2400

Function: Specifies the time of day the demand or backup circuit is available. The router uses this parameter and the End Time parameter to establish a time period when the circuit is available. This parameter also specifies the time of day any secondary lines are available if you configure bandwidth-on-demand service for a PPP demand circuit.

Instructions: Enter an hour of the day, using the 24-hour system of expressing time. For example, to activate the circuit at 5:00 p.m., enter 1700.

For the router to activate the circuit at the configured start time, ensure that the Availability Mode parameter is set to the default, Available. If you do not want the router to activate the circuit at the start time, set the Availability Mode to Not Available.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.11.1.5

Parameter: **End Time**

Path: **Demand Circuits:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition> **Schedule** > Circuit Time of Day Schedule > **Add >** Circuit Time of Day Schedule

Default: 2400

Options: 0 to 2400

Function: Specifies the time of day the demand or backup circuit is no longer available. The router uses this parameter and the Start Time parameter to establish a time period when the circuit is available. This value also specifies the time of day that all secondary lines are deactivated if you set up bandwidth-on-demand service for a PPP demand circuit.

Instructions: Enter an hour of the day, using the 24-hour system of expressing time. For example, to deactivate the circuit at 10:00 p.m., enter 2200.

For the router to deactivate the circuit at the configured end time, ensure that the Availability Mode parameter is set to the default, Available. If you do not want the router to deactivate the circuit at the end time, set the Availability Mode to Not Available.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.11.1.6

Parameter:	**Inactivity Timeout**
Path:	**Demand Circuits only:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule
Default:	Disable
Options:	Enable | Disable
Function:	Determines whether the router uses the Inactivity Time parameter to control circuit activity during the configured start time and end time. The Inactivity Time parameter defines the number of seconds that can elapse without data going across the line before the router disconnects the call.
Instructions:	Enter Enable if you want the router to use the Inactivity Time parameter, and the Start Time and End Time parameters to determine when the circuit is available. If there is no data going across the line, the Inactivity Time parameter instructs the router to disconnect the call. Accept the default, Disable, if you want the router to establish the connection at the start time and remain active until the configured end time, regardless of data activity and regardless of the setting of the Availability Mode parameter. Only the network can bring down the connection.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.11.1.7

Parameter: **Availability Mode**

Path: **Demand Circuits:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List

Backup Circuits: Dialup > Backup Circuits > PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition> **Schedule** > Circuit Time of Day Schedule

Default: Available

Options: Available │ Not Available

Function: Determines whether the router activates the circuit between the configured time interval specified with the Days, Start Time and End Time parameters.

Instructions: Accept the default, Available, to allow the router to establish the circuit between the time interval you specified in the Days, Start Time, and End Time parameters. Select Not Available to prevent the router from establishing the circuit during this time interval.

For demand circuits only, you must set the Inactivity Timeout parameter to Enable for this parameter to have any effect. The Inactivity Timeout parameter is not applicable for backup circuits.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.11.1.8

Parameter: **TimeOfDay Failback Mode**

Path: **Demand Circuits only:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule

Default: Automatic

Options: Automatic │ Manual

Function: For PPP standby circuits only, this parameter controls the failback to the primary circuit if the Standby Failback Mode parameter is set to None.

Instructions: Select Automatic to automatically deactivate the hot standby circuit and return to the primary circuit. The Failback Time parameter for this circuit determines the failback delay. Select Manual to manually deactivate the hot standby circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.11.1.9

Parameter:	**Failback Time (min.)**
Path:	**Demand Circuits only:** Dialup > Demand Circuits **>** Demand Pools> **PPP** or **FR Circuits >** PPP or FR Demand Circuits **> Schedule >** Circuit Time of Day Schedule or Pool Availability List > **Add** > Circuit Time of Day Schedule
Default:	0
Options:	0 to 1439 minutes
Function:	For PPP standby circuits only, this parameter indicates the amount of time the router waits before deactivating the standby circuit and returning to a recovered primary circuit. This option is available only if the Standby Mode parameter is set to Hot Standby, the Standby Failback Mode parameter is set to None, and you have selected a primary circuit for the Standby Primary Circuit parameter.
Instructions:	Enter the amount of time, in minutes, that the router should wait before returning to the primary circuit for data transmission. Be sure to consider how much time it takes to ensure that the primary circuit is stable.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.11.1.10

Demand Circuit Group Parameters

The Demand Circuit Groups window (Figure A-12) contains the demand circuit group parameters.

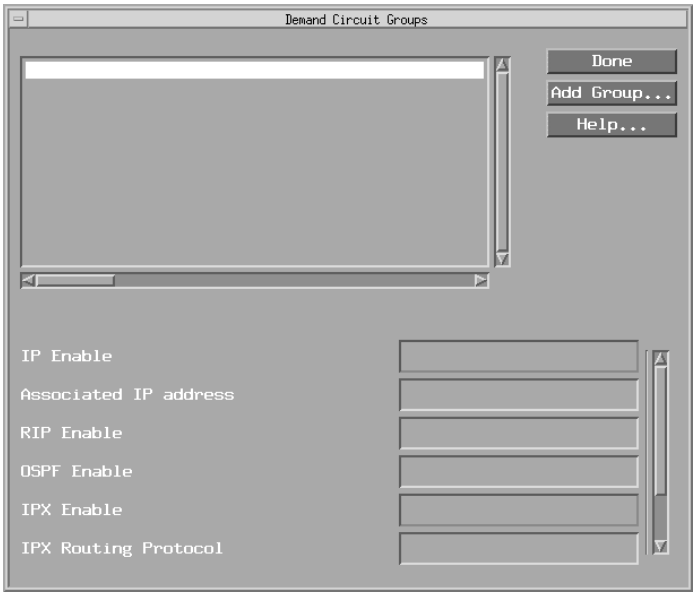

Figure A-12. Demand Circuit Groups Window

The parameter descriptions follow.

Parameter: Pool ID

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups > **Add Group** > Enter a Demand Pool

Default: None

Options: 1 to 255

Function: Identifies the demand pool that you want the demand circuit group to use.

Instructions: Enter the ID number of an existing demand pool.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.6

Parameter: Number of Circuits

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups > **Add Group** > Enter a Demand Pool

Default: None

Options: Maximum number of lines in the line pool

Function: Indicates how many unnumbered circuits are in the demand circuit group.

Instructions: Enter a number that is less than or equal to the number of lines in the demand pool associated with this circuit group.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.4

Demand Circuit Group Protocol Parameters

Parameter: IP Enable

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups

Default: Disable

Options: Enable | Disable

Function: Enables or disables IP for this interface.

Instructions: Select Enable to enable IP for this interface.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.5

Parameter: Associated IP Address

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups

Default: None

Options: Any valid IP address

Function: Specifies an address that IP uses when sending a packet. All circuits in the demand circuit group use this address, which specifies a numbered interface on the router. IP routing protocols use the numbered address to advertise the local router to remote routers. For more information, see *Configuring IP, ARP, RARP, RIP, and OSPF Services*.

Instructions: Enter the address of any numbered interface on the router. If you are running RIP over the unnumbered interface, and are using a subnet address as the associated address, the local and remote associated addresses should have the same network number.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.6

Parameter: RIP Enable

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: Disable
Options: Enable │ Disable
Function: Enables or disables RIP for this interface.
Instructions: Select Enable to enable RIP for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.7

Parameter: OSPF Enable

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: Disable
Options: Enable │ Disable
Function: Enables or disables OSPF for this interface.
Instructions: Select Enable to enable OSPF for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.8

Parameter: IPX Enable

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: Disable
Options: Enable │ Disable
Function: Enables or disables IPX for this interface.
Instructions: Select Enable to enable IPX for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.9

Parameter: IPX Routing Protocol

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: RIP/SAP
Options: RIP/SAP/NLSP
Function: Specifies an IPX routing protocol for the IPX interface.
Instructions: Select an IPX routing protocol for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.12

Parameter: **IPXWAN Enable**

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: Disable
Options: Enable │ Disable
Function: Enables or disables IPXWAN for this interface.
Instructions: Select Enable to enable IPXWAN for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.13

Parameter: **Bridge Enable**

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups
Default: Disable
Options: Enable │ Disable
Function: Enables or disables bridging for this interface.
Instructions: Select Enable to enable bridging for this interface.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.12.1.10

Caller Resolution Info Parameters (Demand Circuit Groups)

The caller resolution parameters for demand circuit groups contain the parameters for the router to identify the remote router who is trying to make a connection.

Parameter: **Caller Name**

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups > **Add Group** > Enter a Demand Pool > **OK** > Caller Resolution Info
Default: None
Options: Any text string; maximum 20 characters
Function: This name is part of the incoming call and informs the local router of the remote router's identity.
Instructions: Enter a text string no longer than 20 characters that identifies a remote router. If you configure CHAP as the authentication protocol, enter the remote router's CHAP name. If you configure PAP, enter the remote router's PAP ID.
MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.2

Parameter: CHAP Secret

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups > **Add Group** > Enter a Demand Pool > **OK** > Caller Resolution Info

Default: Unsecured

Options: Any text string; maximum 20 characters

Function: Specifies the CHAP secret you assign to this interface. The CHAP secret is for identification and security purposes, and must be the same on both sides of the connection.

When one router places a call to another router, the authentication process takes place. During this phase, the routers exchange challenge packets that include the CHAP secret. Both routers on a link must have the same CHAP secret to correctly calculate responses to the challenges.

Instructions: If you configure CHAP as the authentication protocol, specify the CHAP secret. If not, ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.4

Parameter: PAP Password

Path: Dialup > Demand Circuit Groups > Demand Circuit Groups > **Add Group** > Enter a Demand Pool > **OK** > Caller Resolution Info

Default: None

Options: Any text string; maximum 25 characters

Function: Specifies the PAP password you assign to this interface. The PAP password is for identification and security purposes, and must be the same on both sides of the connection.

During the authentication phase, all Password Authenticate-Request messages that the calling router sends to the called router must include the correct password. If the password is not correct, the called router sends an Authenticate-Negative Acknowledgment (Authenticate-NAK) message and the router does not activate the connection.

Instructions: If you configured PAP as the authentication protocol, specify a unique PAP password. If not, ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.5

PPP Circuit Options Parameters (Dial Backup)

The PPP Circuit Options window (Figure A-13) contains the backup circuit options parameters.

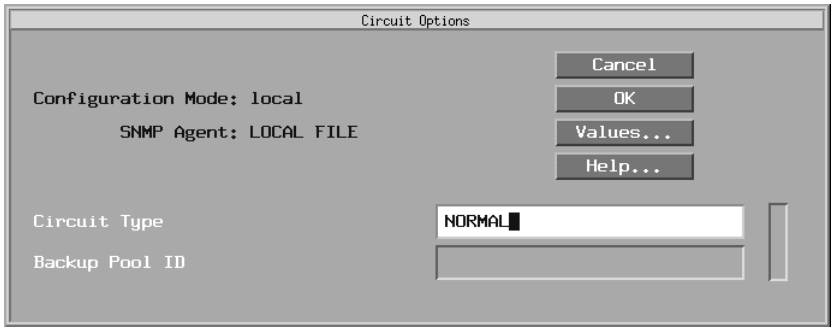

Figure A-13. Circuit Options Window

The parameter descriptions follow.

Parameter: Circuit Type

Path: Dialup > Backup Circuits > PPP > Primary Circuit Definition > **Cct Type >** Circuit Options

Default: Normal

Options: Primary | Normal

Function: Specifies whether the circuit over the selected leased line uses dial backup service. This line is not part of the backup pool. For a standard leased circuit, the router does not provide a backup if the original circuit fails. For a primary circuit, the router provides a backup to carry the data.

Instructions: Accept the default, Normal, if you do not want a backup circuit for the data. Select Primary if you want to use dial backup service.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.1.1.31

Parameter:	**Backup Pool ID**
Path:	Dialup > Backup Circuits > PPP > Primary Circuit Definition > **Cct Type >** Circuit Options
Default:	None
Options:	1 to 255
Function:	Identifies the backup pool for the primary circuit.
Instructions:	If you select Primary for the Circuit Type parameter, enter the ID of the backup pool that this circuit should use. If you accept the default, Normal, for the Circuit Type parameter, do not enter a value for this parameter.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.5

PPP Primary Circuit Definition Parameters (Dial Backup)

The PPP Primary Circuit Definition window (Figure A-14) contains the primary circuit definition parameters.

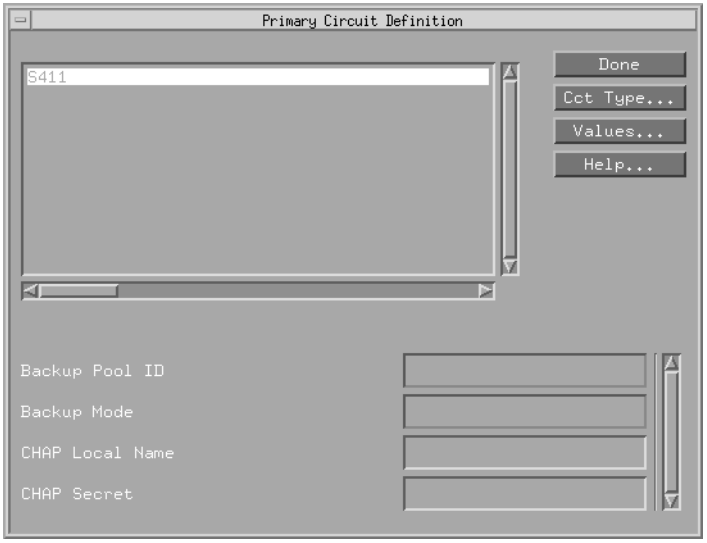

Figure A-14. Primary Circuit Definition Window

The parameter descriptions follow.

Parameter: Backup Pool ID

Path: Dialup > Backup Circuits > PPP > Primary Circuit Definition
Default: None
Options: 1 to 255
Function: Identifies the backup pool for the primary circuit.
Instructions: Enter the ID number of the backup pool this circuit should use.
MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.5

Parameter: Backup Mode

Path: Dialup > Backup Circuits > PPP > Primary Circuit Definition

Default: Master

Options: Master | Slave

Function: Determines which router initiates dialing to establish a backup connection if the primary circuit fails.

Instructions: Accept the default, Master, if you want the router to initiate dialing. The router at the other end must be set to Slave so that it waits until the master router initiates the call. Only one router on the link can serve as the master router. If both are set to Master, they may try to initiate a call simultaneously, resulting in a collision on the network.

If you change the Backup Mode parameter from Master to Slave, Site Manager displays the Caller Resolution Info window, prompting you to make a caller resolution table entry for the circuit. By requiring a table entry, Site Manager ensures that you identify the remote master router.The local router can then verify the master router's identity and accept the incoming calls. Refer to the appropriate parameter descriptions for this window.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.7

Frame Relay Interface Parameters (Dial Backup)

The FR Interface window (Figure A-15) contains the interface type parameter, which defines the frame relay connection type.

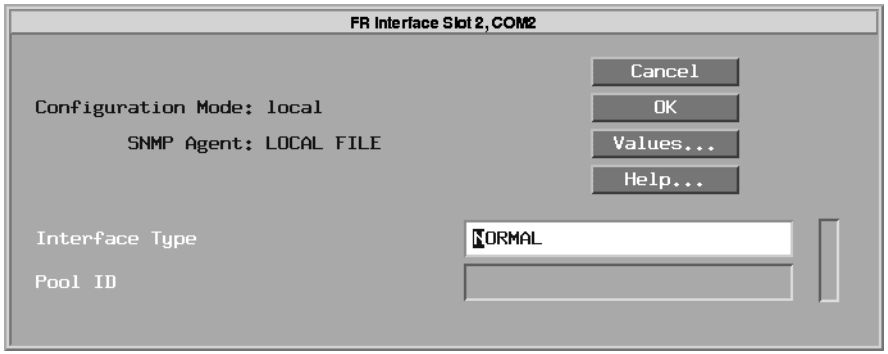

Figure A-15. FR Interface Window

The parameter descriptions follow.

Parameter: Interface Type

Path: Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition > **Intf. Type >** FR Interface Slot <*n*>,<*port*>

Default: Normal

Options: Normal │ Primary/Shared │ Primary/Secondary

Function: Specifies whether this leased circuit uses dial backup service. For a standard leased circuit, the router does not provide a backup circuit if it fails. For a primary circuit, the router provides a backup circuit.

Instructions: Select one of the following options:

Normal -- Indicates that there is no backup service for this circuit.

Primary/Shared -- Enables backup service and instructs the router that the backup circuit should inherit the primary circuit's configuration.

If you select this option, Site Manager displays a dialog box asking if you want the primary circuit's PVCs duplicated on the backup circuit.

- Select **Yes** to create a duplicate set of PVCs with the same DLCI numbers as the primary circuit. This is useful if you want the same DLCI numbers going to the same destination.
- Select **No** to configure unique PVCs for the backup circuit. This option is useful if you do not want to back up all of the primary's PVCs. By limiting the number of backup PVCs, you can reduce line costs.

Primary/Secondary -- Enables backup service and instructs the router that the backup circuit should use its own configuration. The backup circuit does not adopt the primary circuit's configuration.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.9.1.1.33

Parameter:	**Pool ID**
Path:	Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition > **Intf. Type >** FR Interface Slot <*n*>,<*port*>
Default:	None
Options:	1 to 255
Function:	Identifies the backup pool that the primary circuit uses.
Instructions:	If you selected primary/shared or primary/secondary as the interface type, enter an existing backup pool for the primary circuit. If you selected Normal as the interface type, do not enter a pool ID.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.5

Frame Relay Primary Interface Definition Parameters (Dial Backup)

The FR Primary Interface Definition window (Figure A-16) contains the interface definition parameters for the frame relay backup circuit.

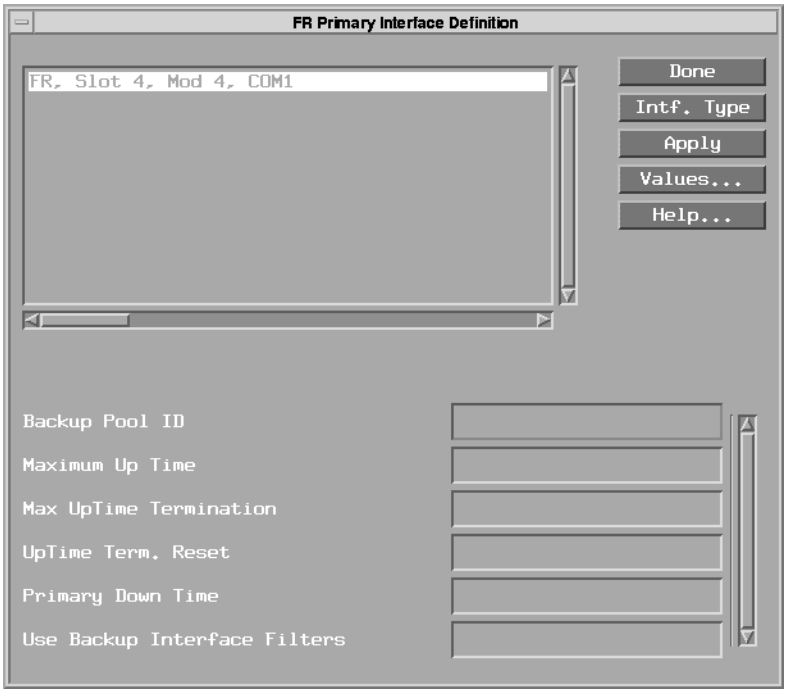

Figure A-16. FR Primary Interface Definition Window

The parameter descriptions follow.

Parameter: Backup Pool ID

Path:	Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition
Default:	None
Options:	1 to 255
Function:	Identifies the backup pool for the primary circuit.
Instructions:	Enter the ID number of the backup pool this circuit should use.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.5

Parameter: Primary Down Time

Path:	Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition
Default:	5 minutes
Options:	1 to 999,999 minutes
Function:	Specifies the amount of time the router waits after it boots, before activating a backup connection. This timer ensures that the primary connection is not operating before the router activates a backup connection.
Instructions:	Enter the amount of time the router should wait before activating a backup connection.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.5.1.17

Parameter: Use Backup Interface Filters

Path:	Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition
Default:	Disabled
Options:	Enabled | Disabled
Function:	Enables the routers to filter unwanted data from going across the backup circuit. This parameter is configurable only if the interface type is primary/shared.
Instructions:	Select Enable to use filters; otherwise, accept the default.
MIB Object ID:	1.3.6.1.4.1.18.3.5.9.9.1.1.34

Frame Relay Service Control Parameter (Demand and Dial Backup)

To enable frame relay for an interface, you enable this parameter. This parameter is the same as the Enable parameter in the Frame Relay Interface List window. See *Configuring Frame Relay Services* for all the interface parameter descriptions.

Parameter: **FR Service Control (called Enable in Frame Relay Interface List)**

Path: **Demand Circuits:** Dialup > Demand Circuits > **FR Circuits** > FR Demand Circuits > **Demand Intf.** > FR Demand Interface List

Backup Circuits: Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition > **Backup Def.** > FR Backup Interface

Default: Enable (for dial backup primary/shared interfaces) │ Disable (for dial backup primary/secondary interfaces and dial-on-demand interfaces)

Options: Enable │ Disable

Function: Enables the frame relay interface.

Instructions: For dial backup primary/secondary interfaces and dial-on-demand interfaces, select Enable to activate the frame relay interface after the configuration is complete. Otherwise, accept the default.

For dial backup primary/shared interfaces, select Disable to deactivate the frame relay interface. Otherwise, accept the default.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.9.1.1.2

Parameter: **Hangup on DLCMI Failure**

Path: **Demand Circuits:** Dialup > Demand Circuits > **FR Circuits** > FR Demand Circuits > **Demand Intf.** > FR Demand Interface List

Backup Circuits: Dialup > Backup Circuits > Frame Relay > FR Primary Interface Definition > **Backup Def.** > FR Backup Interface

Default: Disable

Options: Enable │ Disable

Function: Indicates whether to terminate the dial-up connection if the frame relay switch does not initially respond to the call with a full status message.

Instructions: Select Enable if you want the router to clear the demand or backup circuit when the switch does not respond. Otherwise, accept the default.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.9.1.1.32

Frame Relay PVC and Service Parameters (Demand and Dial Backup)

See *Configuring Frame Relay Services* for PVC and service record parameter descriptions.

You cannot enter values for the following frame relay PVC parameters: Node Protection Key, Encrypt Enable, LTSS Name, LTSS Value, and MEK Change. These parameters are available only if you enable data encryption. For information about encryption, see *Configuring Data Encryption Services.*

Bandwidth-on-Demand Circuit Options Parameters

The Circuit Options window (Figure A-17) contains the circuit options that enable bandwidth-on-demand service.

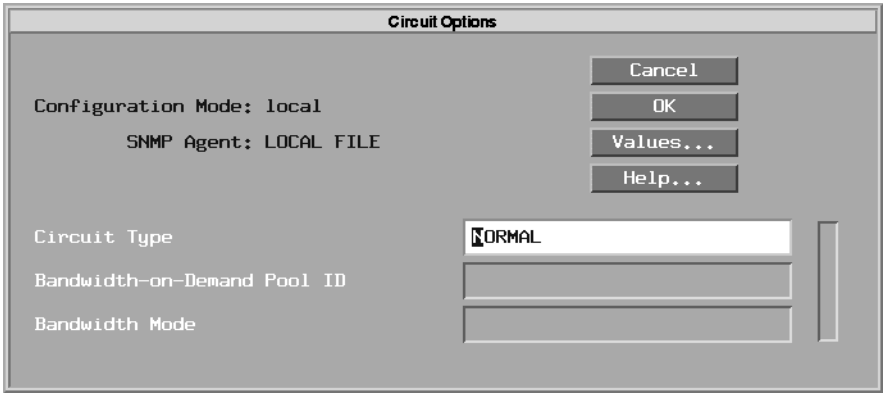

Figure A-17. Circuit Options Window

The parameter descriptions follow.

Parameter: Circuit Type

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Cct Type** > Circuit Options

Default: Normal

Options: Normal | Bandwidth-on-Demand

Function: Specifies whether the leased circuit uses bandwidth-on-demand service. For a normal synchronous circuit, the router does not provide bandwidth-on-demand service. For a bandwidth circuit, the router provides up to 29 additional lines to carry traffic when the bandwidth circuit is congested.

Instructions: Accept the default, Normal, if you do not want secondary circuits available for leased circuits. Select Bandwidth-on-Demand to provide bandwidth-on-demand service for a congested single circuit or multilink circuit.

Site Manager lists the circuit type next to the circuit name. If you select Non-Monitor for the Bandwidth Mode parameter, Site Manager will not allow you to enter values for the CHAP Local Name, CHAP Secret, PAP Local ID, and PAP Password parameters. These parameters are part of configuring the router as congestion monitor.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.3

Parameter: Bandwidth-On-Demand Pool ID

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Cct Type** > Circuit Options

Default: None

Options: 1 to 255

Function: Identifies the bandwidth pool associated with the bandwidth circuit.

Instructions: If you select Bandwidth-on-Demand for the Circuit Type parameter, enter the ID of the bandwidth pool that this circuit should use. If you select Normal for the Circuit Type parameter, Site Manager does not allow you to enter a pool ID.

You must create a pool before you can specify a circuit as a bandwidth circuit. The router first creates the circuit as a normal circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.35

Parameter: Bandwidth Mode

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Cct Type** > Circuit Options

Default: Non-Monitor (for leased circuits) | Dynamic Monitor (for demand circuits)

Options: Non-Monitor | Monitor | Dynamic Monitor (demand circuits only)

Function: Determines whether the router serves as the monitor router. The level of congestion determines when the router provides an additional circuit to carry data across the network.

Instructions: Select one of the following options:

Monitor -- Instructs the router to watch the congestion on the line or bundle. Only one router on the link can serve as the monitor router and activate a secondary line. The other router must be set to Non-Monitor. If both are set to Monitor, they may try to activate a secondary line simultaneously, resulting in a collision on the network.

If you configure bandwidth-on-demand service to aid a demand circuit, and this parameter is set to Monitor, ensure that the demand circuit's Connection Mode parameter is set to Collision Master or Collision Slave.

Non-Monitor -- Instructs the non-monitor router to wait for the monitor router to activate secondary lines. This router is not responsible for monitoring the congestion and it cannot initiate a connection.

Dynamic Monitor -- Select this option for configurations that use BAP to allocate bandwidth. It enables the router to function as the monitor or non-monitor router based on the direction of the call. With this value set, the router who initiates the call is the monitor, and the router who receives the call is the non-monitor.

If your router is communicating with a remote Nortel Networks router, the remote router must be set to Dynamic Monitor, unless it uses software prior to Version 11.01, in which case, do not select this option.

If your router is communicating with a non-Nortel Networks router, select this option.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.36

Bandwidth-on-Demand Circuit Definition Parameters

The Bandwidth-on-Demand Circuit Definition window (Figure A-18) contains the circuit definition parameters for the bandwidth circuit.

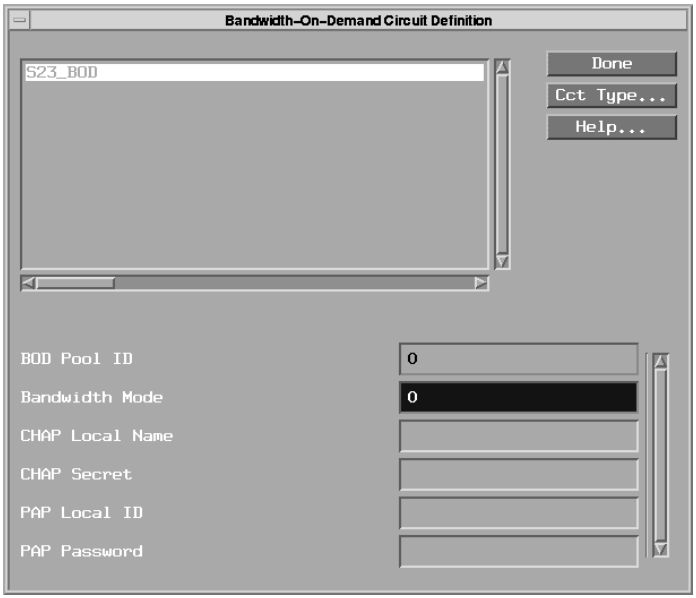

Figure A-18. Bandwidth-on-Demand Circuit Definition Window

The parameter descriptions follow.

Parameter: BOD Pool ID

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition

Default: None

Options: 1 to 255

Function: Identifies the bandwidth pool associated with the bandwidth circuit.

Instructions: If you select Bandwidth-on-Demand for the Circuit Type parameter, enter the ID of the bandwidth pool that this circuit should use. If you select Normal for the Circuit Type parameter, Site Manager does not allow you to enter a pool ID.

You must create a pool before you can specify a circuit as a bandwidth circuit. The router first creates the circuit as a normal circuit.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.35

Parameter: Bandwidth Mode

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Cct Type** > Circuit Options

Default: Non-Monitor (for leased circuits) | Dynamic Monitor (for demand circuits)

Options: Non-Monitor | Monitor | Dynamic Monitor (demand circuits only)

Function: Determines whether or not the router serves as the congestion monitor. The level of congestion determines when the router provides an additional circuit to carry data across the network.

Instructions: Refer to page A-79 for a description of this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.36

Bandwidth-on-Demand Congestion Monitor and BAP Parameters

The BOD Configuration window (Figure A-19) contains the monitor option parameters for bandwidth-on-demand service.

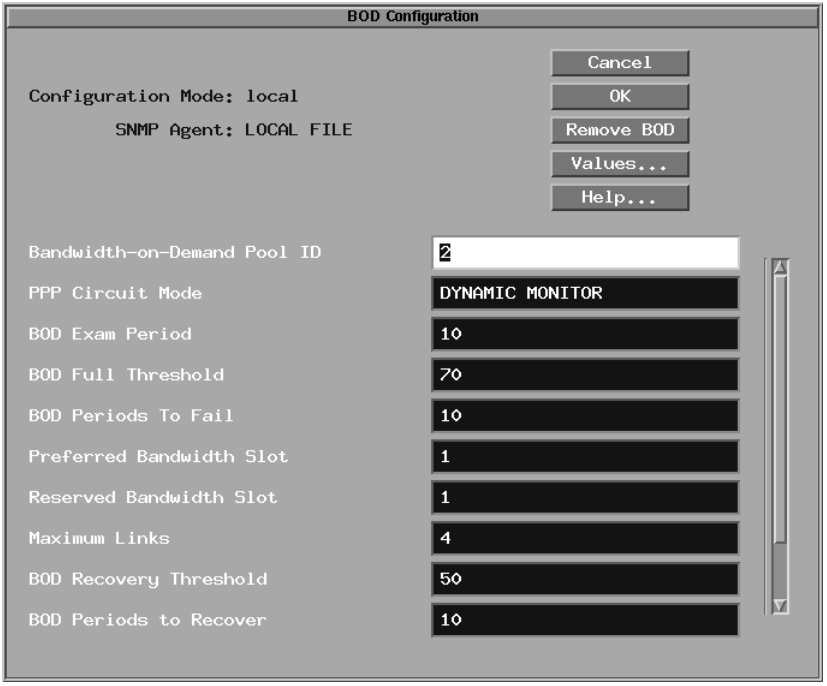

Figure A-19. BOD Configuration Window

The parameter descriptions follow.

Parameter: **Bandwidth-on-Demand Pool ID**

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: None

Options: 1 to 255

Function: Identifies an existing bandwidth pool.

Instructions: Enter the ID number of the bandwidth pool you want the circuit to use.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.5.1.35

Parameter: **PPP Circuit Mode**

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: Multilink

Options: Multilink | Multilink Monitor | Dynamic Monitor

Function: Specifies the type of multilink connection for this interface and the value of the PPP interface parameter PPP Mode.

Instructions: Select one of the following:

Multilink -- Site Manager supplies this value if the Bandwidth Mode parameter is Non-Monitor. It enables PPP multilink for this circuit. Selecting this value also prevents you from configuring the other monitor parameters.

Multilink Monitor -- Site Manager supplies this value if the Bandwidth Mode is Monitor. It enables PPP multilink and tells the router to monitor congestion.

If you configure bandwidth-on-demand service to aid a demand circuit, and this parameter is set to Monitor, ensure that the demand circuit's Connection Mode parameter is set to Collision Master or Collision Slave.

Dynamic Monitor -- Select this option for BAP connections to allocate bandwidth. This option lets the router function as the monitor or non-monitor router based on the direction of the call. The router who initiates the call is the monitor, and the router who receives the call is the non-monitor. If your router is communicating with a non-Nortel Networks router, select this option. If your router is communicating with a Nortel Networks router that uses software prior to Version 11.01, do not select this option.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.50

Parameter: BOD Exam Period

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 10 (0.10-second intervals)

Options: 5 to 200 (in 0.10-second intervals)

Function: Indicates how often the router checks the bandwidth circuit to determine if the line or bundle is congested.

Instructions: Enter a value specifying how often you want the router to check the congestion on the bandwidth circuit. For example, entering a value of 200 means that the router checks the line every 20 seconds (200 x 0.10 seconds = 20 seconds).

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.52

Parameter: BOD Full Threshold

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 70 percent

Options: 10 to 400 percent

Function: Specifies a percentage of the maximum amount of data that the router transmits and receives. The data traffic must reach or exceed this percentage before the router considers the line or bundle congested.

Instructions: Enter a percentage that the router uses to measure congestion. If you configured the WAN compression protocol (WCP) on the circuit and it is configured to run below the multilink bundle, you may want to configure a threshold greater than 100 percent.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.53

Parameter: BOD Periods to Fail

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 10

Options: 1 to 100

Function: Specifies the number of consecutive times the router finds that data traffic on the bandwidth circuit exceeds the configured congestion threshold, thereby concluding that the line or bundle is congested.

Instructions: Enter the number of consecutive times the circuit can exceed the threshold before the router activates a secondary line.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.54

Parameter: Preferred Bandwidth Slot

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: None

Options: Available slots in the bandwidth pool. For example, if the bandwidth pool has lines from slot 3 and slot 4, you cannot enter a value of 5.

Function: Specifies the slot the router chooses first when adding a line to a multilink bundle. For BAP configurations, the non-monitor router uses this parameter to determine which lines are available. It then sends the local phone number associated with an available line to the monitor router, which then dials the number to activate the line for additional bandwidth.

Instructions: Enter the number of the slot you want the router to use first, but note the following:

- Site Manager looks for another circuit configured as Monitor in the same pool as the newly created circuit. If one exists, Site Manager copies the value for the existing circuit's Preferred Bandwidth Slot parameter and enters it for this parameter. You do not have to enter a value.
- If this is the first circuit configured as Monitor in a pool that uses only one slot, Site Manager automatically enters the slot number. You do not have to enter a value.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.55

Parameter: Reserved Bandwidth Slot

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: None

Options: Available slots in the bandwidth pool. For example, if the bandwidth pool has lines from slot 3 and slot 4, you cannot enter a value of 5.

Function: Specifies the slot the router chooses when adding a line to a multilink bundle if the preferred slot cannot provide a line. For BAP configurations, the non-monitor router uses this parameter to determine which lines are available. It then sends the local phone number associated with an available line to the monitor router, which then dials the number to activate the line for additional bandwidth.

Instructions: Enter the number of the slot you want the router to use after checking the preferred slot, but note the following:

- Site Manager looks for another circuit configured as Monitor in the same pool as the newly created circuit. If one exists, Site Manager copies the value for the existing circuit's Reserved Bandwidth Slot parameter and enters it for this parameter. You do not have to enter a value.
- If this is the first circuit configured as Monitor in a pool that uses only one slot, Site Manager automatically enters the slot number. You do not have to enter a value.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.56

Parameter: Maximum Links

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 4

Options: 1 to 30

Function: Specifies the maximum number of links (both leased and dial-up lines) allowed in the multilink bundle for this circuit at any one time.

Instructions: Enter the maximum number of links that you want in the bundle.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.58

Parameter: BOD Recovery Threshold

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 50 percent

Options: 10 to 400 percent

Function: Specifies a percentage of the maximum amount of data that the router transmits and receives. The actual flow of data traffic must fall below this percentage before the router returns to the leased line or bundle exclusively.

Instructions: Enter a percentage that the router should reach before it returns to the leased line or bundle. If you configured the WAN compression protocol (WCP) on the circuit and it is configured to run below the multilink bundle, you may want to configure a threshold greater than 100 percent.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.59

Parameter: BOD Periods to Recover

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 10

Options: 1 to 100

Function: Specifies the number of consecutive times the router checks the bandwidth circuit and determines that data traffic is below the configured congestion threshold. Once the router concludes that the circuit is no longer congested, it returns to the leased line or bundle exclusively.

Instructions: Enter the number of times the router should check if there is no longer a congestion condition before bringing down the secondary line.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.60

Parameter: **Multilink Fragmentation**

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: Permitted

Options: Permitted | Prohibited

Function: Enables the router to split up the data packet into smaller segments for more efficient transfer across the multilink circuit.

Instructions: Accept the default, Permitted, to enable fragmentation; otherwise, select Prohibited.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.51

Parameter: **Fragmentation Trigger Size**

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: 256

Options: 64 to 4000

Function: Specifies the minimum packet size that the router will fragment into smaller packets.

Instructions: Enter the packet size that will cause the router to fragment the packet.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.57

Parameter: **BAP Enable**

Path: Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options

Default: Disable

Options: Enable | Disable

Function: Enables or disables BAP service to manage the allocation of bandwidth across a multilink bundle. BAP is available only for ISDN lines.

Instructions: To enable BAP, choose Enable; otherwise, accept the default, Disable.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.2.1.66

Parameter:	**BAP No Phone Number Needed**
Path:	Dialup > Bandwidth On Demand Circuits > Bandwidth On Demand Circuit Definition > **Options** > Bandwidth On Demand Monitor Options
Default:	Enable
Options:	Enable | Disable
Function:	Instructs the non-monitor router whether to send its local phone number to the monitor router during BAP negotiations for more bandwidth.
Instructions:	Accept the default, Enable, if all the numbers that the monitor router requires are in the outgoing phone list. This value tells the non-monitor router not to supply phone numbers. Select Disable if you configured only one outgoing phone number for the monitor router and you want the non-monitor router to supply phone numbers for dial-up connections. This option minimizes the task of configuring the outgoing phone list. Select Disable only for configurations where the default values of the ISDN Numbering Plan and ISDN Numbering Type parameters, located in the outgoing phone list, are acceptable to the ISDN switch **Note:** Certain countries have ISDN networks where the default values of the ISDN Numbering Plan and ISDN Numbering Type parameters do not work. Ask your sales engineer for details.
MIB Object ID:	1.3.6.1.4.1.18.3.5.9.2.2.1.68

Local Phone Number Parameters

The ISDN Local Phone Numbers window (Figure A-20) contains the local phone list parameters.

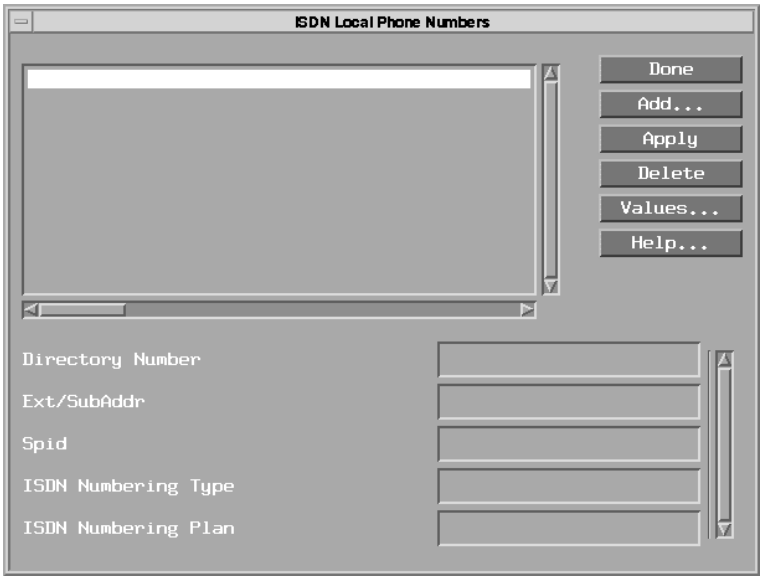

Figure A-20. ISDN Local Phone Numbers Window

The parameter descriptions follow.

Parameter: Directory Number

Path: Dialup > Local Phone Numbers > ISDN Local Phone Lines > **Local Phones** > ISDN Local Phone Numbers > **Add** > Phone Number

Default: None

Options: A maximum of 20 numeric characters

Function: Specifies the phone number of the router. The value of this parameter must match the phone number that your service provider assigns to you when you receive ISDN service.

Any remote party that calls the router must include this phone number in the Called Party IE field of the call setup message. The Called Party IE must match the directory number exactly or the router will not answer the call.

Instructions: Enter the phone number your ISDN provider supplied when you received ISDN service. For switches in the United States, do not include the area code when you enter the phone number.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.12.1.4

Parameter: Ext/SubAddr

Path: Dialup > Local Phone Numbers > ISDN Local Phone Lines > **Local Phones** > ISDN Local Phone Numbers > **Add** > Phone Number

Default: None

Options: A maximum of 25 numeric characters

Function: Specifies a subaddress or an extension line for a main phone number that further identifies the local router. The subaddress is useful when you have several routers at a destination site, but the ISDN provider assigns only one phone number to the destination site. An incoming call has to specify the number and the subaddress to reach a specific router.

Instructions: Enter the extension/subaddress. You may assign this number or your ISDN provider may assign it when you receive ISDN service. Do not enter space, special, or alphabetic characters in the telephone number.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.12.1.5

Parameter: SPID

Path: Dialup > Local Phone Numbers > ISDN Local Phone Lines > **Local Phones** > ISDN Local Phone Numbers > **Add** > Phone Number

Default: None

Options: A maximum of 20 numeric characters

Function: For switches in the United States and Canada, the Service Profile Identifier (SPID) identifies an ISDN device to the switch so it knows which services to provide.

Instructions: Enter the SPID that your ISDN provider supplied when you received ISDN service. Ignore this parameter if you have a 5ESS switch on a point-to-point line.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.12.1.6

Parameter: ISDN Numbering Type

Path: Dialup > Local Phone Numbers > ISDN Local Phone Lines > **Local Phones** > ISDN Local Phone Numbers

Default: Unknown

Options: Unknown │ International │ National │ Specific │ Subscriber │ Abbreviated

Function: Indicates the standard that the phone number follows. The router passes this information to the ISDN switch.

Instructions: Accept the default value, Unknown, unless your service provider explicitly instructs you to use another value.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.8.12.1.9

Parameter:	**ISDN Numbering Plan**
Path:	Dialup > Local Phone Numbers > ISDN Local Phone Lines > **Local Phones** > ISDN Local Phone Numbers
Default:	Telephony
Options:	Unknown | Telephony | X121 | Telex | Standard | Private
Function:	Indicates the standard that the phone number plan follows. The router passes this information to the ISDN switch.
Instructions:	If you set the Switch Type parameter to BRI NTT, BRI KDD, or BRI NI1, select the value, Unknown. For all other switches, Site Manager uses the default value Telephony. Accept Telephony unless your service provider instructs otherwise.
MIB Object ID:	1.3.6.1.4.1.18.3.5.9.8.12.1.10

Outgoing Phone List Parameters

The Outgoing Phone List window (Figure A-21) contains the outgoing phone list parameters.

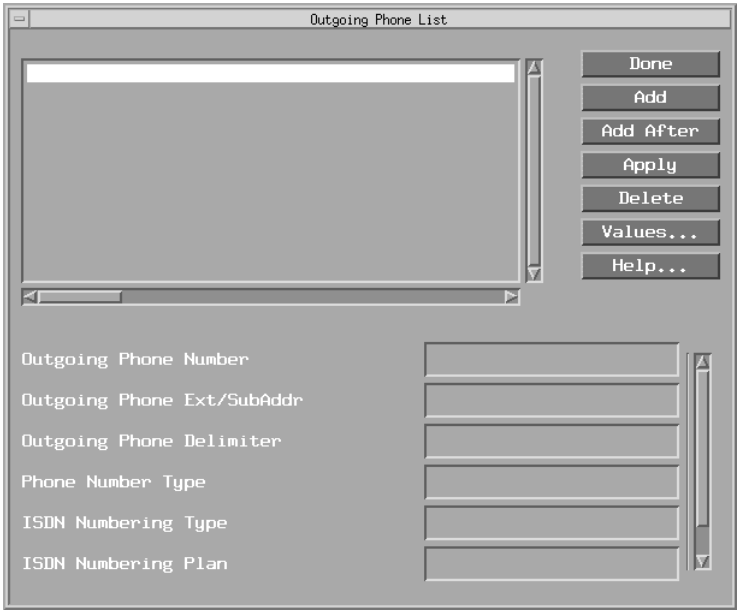

Figure A-21. Outgoing Phone List Window

The parameter descriptions follow.

Parameter:	**Outgoing Phone Number**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number
Default:	None
Options:	Up to 25 numeric characters
Function:	Specifies the telephone number of the remote router.
Instructions:	Enter the telephone number of the remote router. Do not enter space, special, or alphabetic characters in the telephone number.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.4

Parameter:	**Outgoing Phone Ext/SubAddr**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number
Default:	None
Options:	Any string up to 25 numeric characters
Function:	For V.25bis, Hayes, and ISDN calls, specifies a subaddress or extension for a phone number, further identifying the remote router. For ISDN calls, this subaddress is useful when there are several routers at a destination site, but the ISDN provider only assigns the destination one phone number. An incoming call must specify the number and subaddress to reach a specific router.
Instructions:	Enter an extension/subaddress of up to 25 characters. Do not enter space, special, or alphabetic characters in the telephone number.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.5

Parameter: Outgoing Phone Delimiter

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List > **Add** > Phone Number

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number

Default: None

Options: Any string of up to five characters. An example of a single-character delimiter is a backslash (\).

Function: For V.25bis calls only, this delimiter separates the phone number from the extension.

Instructions: Enter a delimiter if the remote device requires one between the phone number and the extension. Use a character or set of characters that the remote device accepts.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.6

Parameter:	**Outgoing Phone Number Type**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number
Default:	ISDN or Dial Sync
Options:	Dial Sync | Dial Async | ISDN
Function:	Distinguishes whether the phone number is for a V.25bis or Hayes connection or a direct ISDN network connection. Additionally, it indicates whether the V.25bis number is for a synchronous or asynchronous interface.
Instructions:	Choose an option as follows: **Dial Sync** or **Dial Async** if the router is using V.25bis signaling. **Dial Async** if the router is using Hayes signaling. **ISDN** if the router establishes the connection over an ISDN line. You must also supply values for the ISDN Numbering Type and Numbering Plan parameters. If you have a line pool that combines ISDN, V.25bis, and Hayes signaling, the destination phone number for some lines may be the same. If this is the case, you need to enter the destination phone number twice, once as type **ISDN** and once as type **Dial Sync** or **Dial Async**. The router then has two lines to dial the call.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.7

Parameter: **ISDN Numbering Type**

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List

Default: Unknown

Options: Unknown │ International │ National │ Specific │ Subscriber │ Abbreviated

Function: This parameter indicates the standard that the phone number follows. The router passes this information to the ISDN switch.

Instructions: Accept the default value, Unknown, unless your service provider explicitly instructs you to use another value.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.8

Parameter: **ISDN Numbering Plan**

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List

Default: Telephony

Options: Unknown │ Telephony │ X121 │ Telex │ Standard │ Private

Function: This parameter indicates the standard that the phone number plan follows. The router passes this information to the ISDN switch.

Instructions: If you set the Switch Type parameter to BRI NTT, BRI KDD, or BRI NI1 select the value Unknown. For all other switch types, Site Manager uses the default, Telephony. Accept Telephony unless your service provider explicitly instructs you to use another value.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.9

Parameter: **Adaption Rate**

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List

Default: 64K

Options: 64K | 56K

Function: For ISDN calls only, specifies the rate at which the local router wants to send data to the remote destination.

Instructions: Enter a value of 56K if the connections to the destination device only support this rate; otherwise, accept the default, 64K. If you are unsure of your network connections, ask your network provider.

If the value of this parameter is less than the value of the Global Adaption Rate parameter, then this value overrides the Global Adaption Rate value. For example, if this parameter is set to 56 Kb/s and the Global Adaption Rate is set to 64 Kb/s, the router uses the rate of 56 Kb/s for the outgoing call. If the value of the parameters is equal, or only the Global Adaption Rate parameter is set, the router uses the global value and ignores the outgoing phone number's value.

If no value is set for either parameter, the router uses the default, 64 Kb/s.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.10

Parameter: **Remote Pool Type**

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List

Default: Dial and Bandwidth on Demand

Options: Dial on Demand │ Bandwidth on Demand │ Dial and Bandwidth on Demand

Function: Specifies whether the remote router's line associated with the outgoing phone number is in a demand pool, bandwidth pool, or both. The router then uses only the outgoing phone numbers whose values for this parameter match the pool type of the destination connection. This parameter is for applications that use bandwidth-on-demand to aid congested demand circuits.

By configuring the Remote Pool Type parameter, you prevent the local circuit from using a phone number associated the wrong type of remote pool. If a demand circuit places a call to a bandwidth pool, the remote router terminates the connection.

Instructions: Enter the type of remote line pool associated with the outgoing phone number. Use the following guidelines:

- Enter Dial on Demand if the line connected to the remote router is only in a demand pool.
- Enter Bandwidth on Demand if the line connected to the remote router is only in a bandwidth pool.
- Enter Dial and Bandwidth on Demand if the line connected to the remote router is in a demand pool and a bandwidth pool.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.11

Parameter: **Connection Type**

Path: Dialup > Demand/Backup/Bandwidth On Demand Circuits:

Demand Circuits: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List

Backup Circuits: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List

Bandwidth Circuits: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List

Default: Multiple

Options: Single │ Multiple

Function: Indicates whether the router uses the phone number for a single call or multiple calls for applications that use bandwidth-on-demand to aid congested demand circuits.

If you select Single, the router checks whether this phone number is already in use for a circuit on the same slot. If the remote device is already busy, the router does not attempt to place the call using this number. Choosing the Single option is particularly important if the line is connected to an external device such as a modem. If the router places a call to device that is busy, it takes a long time before the router determines that the device is unavailable. By selecting Single, you eliminate this loss of time.

If you select Multiple, the router can use the phone number for many calls. For example, if you are using PRI service, you have many channels that can use the same phone number to place a call. Therefore, you would select Multiple for this parameter.

Instructions: Choose Single if the remote destination can only support a single connection with this outgoing phone number. If a circuit on the same slot is already using this phone number, the router will use another phone number in the list. Otherwise, accept the default, Multiple.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.6.1.12

Parameter:	**Channel Bandwidth Type**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List
Default:	BChannel
Options:	BChannel | Multirate
Function:	Determines whether this call uses multirate service. This parameter is only applicable for PRI on an MCT1 or QMCT1 Link Module.
Instructions:	If you purchased multirate service from your service provider, select Multirate. Otherwise, accept the default, BChannel.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.13

Parameter:	**Aggregate Bandwidth**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List
Default:	128K (2*64K)
Options:	128K (2*64K) to 1472K (23*64K)
Function:	Determines the total bandwidth, that is, the number of B channels in use for this PRI multirate call.
Instructions:	Select the number of B channels the router should use for calls to this remote destination. Remember that the call will fail if there are not enough channels available in the bandwidth pool.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.14

Parameter:	**Outgoing Phone Prefix**
Path:	Dialup > Demand/Backup/Bandwidth On Demand Circuits: **Demand Circuits**: PPP or FR Circuits > PPP or FR Demand Circuits > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Backup Circuits**: PPP or Frame Relay > Primary Circuit Definition or FR Primary Interface Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number **Bandwidth Circuits**: Bandwidth On Demand Circuit Definition > **Phone Out** > Outgoing Phone List > **Add** > Phone Number
Default:	ATDT
Options:	Any valid AT command string
Function:	For asynchronous PPP connections only, this parameter specifies a prefix that the router sends to the modem to initiate dialing.
Instructions:	Accept the default, ATDT, or enter a valid AT initialization command. Refer to Appendix E for a list of AT initialization commands for the ARN. Your modem may use a different set of commands, so refer to the manual for that modem.
MIB Object ID:	1.3.6.1.4.1.18.3.5.1.4.6.1.15

Incoming Phone List Parameters

The Incoming Phone List window (Figure A-22) contains the incoming phone list parameters.

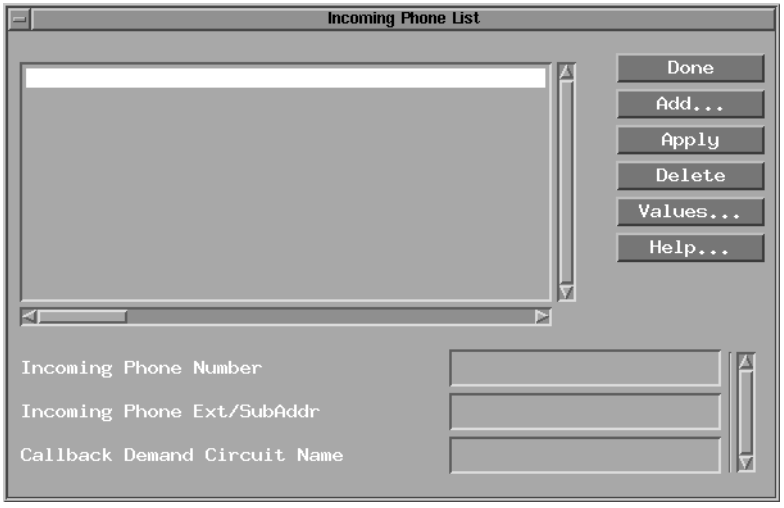

Figure A-22. Incoming Phone List Window

The parameter descriptions follow.

Parameter: Incoming Phone Number

Path: Dialup > Incoming Phone Numbers > Incoming Phone List > **Add** > Phone Number

Default: None

Options: Any string up to 25 numeric characters

Function: Specifies the telephone number of the remote router.

Instructions: Enter the telephone number of the remote router. Do not enter space, special, or alphabetic characters in the telephone number.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.7.1.3

Parameter: **Incoming Phone Ext/SubAddr**

Path: Dialup > Incoming Phone Numbers > Incoming Phone List > **Add** > Phone Number

Default: None

Options: Any string up to 25 numeric characters

Function: Specifies a subaddress for a main phone number that further identifies the remote router. This subaddress is useful when you have several routers at a destination site, but the ISDN provider assigns only one phone number to that destination site. An incoming call must specify the number and the subaddress to reach a specific router.

Instructions: Enter the extension/subaddress. Do not enter space, special, or alphabetic characters in the telephone number.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.7.1.4

Parameter: **Callback Demand Circuit Name**

Path: Dialup > Incoming Phone Numbers > Incoming Phone List

Default: None

Options: Available callback demand circuits

Function: This parameter is only for callback service. When the Callback Mode parameter value is Server One Charge or Server One Charge Call ID, this parameter specifies the circuit that the server uses to call back the client.

Instructions: Click on the Values button. Site Manager displays a list of available callback circuits. Select the circuit you want and click on OK.

MIB Object ID: 1.3.6.1.4.1.18.3.5.1.4.7.1.9

Caller Resolution Table Parameters

The Caller Resolution Table window (Figure A-23) contains the caller resolution parameters.

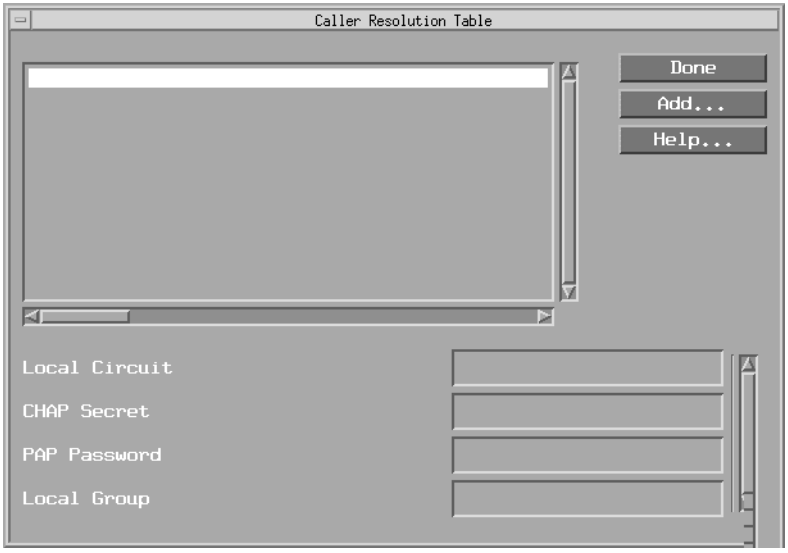

Figure A-23. Caller Resolution Table Window

The parameter descriptions follow.

Parameter: Caller Name

Path: Dialup > Caller Resolution Table > **Add** > Caller Name and Secret/Password

Default: None

Options: Any text string; maximum of 20 characters

Function: This name is part of the incoming call and informs the local router of the remote router's identity.

Instructions: Enter a text string no longer than 20 characters that identifies a remote router. If you configure CHAP as the authentication protocol, you must enter the remote router's CHAP name. If you configure PAP, you must enter the remote router's PAP ID.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.2

Parameter: CHAP Secret

Path: Dialup > Caller Resolution Table > **Add** > Caller Name and Secret/Password

Default: Unsecured

Options: Any text string; maximum of 20 characters

Function: Specifies the CHAP secret you assign to this interface. The CHAP secret is for identification and security purposes, and it must be the same on both sides of the connection.

When one router places a call to another router, an authentication process takes place. During this phase, the routers exchange challenge packets that include the CHAP secret. Both routers on a link must have the same secret to correctly calculate responses to the challenges.

Instructions: If you configure CHAP as the authentication protocol, specify the CHAP secret. If not, ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.4

Parameter: PAP Password

Path: Dialup > Caller Resolution Table > **Add** > Caller Name and Secret/Password

Default: None

Options: Any text string; maximum of 25 characters

Function: Specifies the PAP password you assign to this interface. The PAP password is for identification and security purposes, and must be the same on both sides of the connection.

During the authentication phase, all Password Authenticate-Request messages that the calling router sends to the called router must include the correct password. If the password is not correct, the called router sends an Authenticate-Negative Acknowledgment (Authenticate-NAK) message and the calling router does not activate the connection.

Instructions: If you configured PAP as the authentication protocol, specify a unique PAP password. If not, ignore this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.5

Parameter: Local Circuit

Path: Dialup > Caller Resolution Table

Default: None

Options: Available demand, primary, or bandwidth circuit

Function: Identifies a previously configured demand, primary, or bandwidth circuit. You assign this circuit to a remote router, which you specify in the Caller Name parameter. When the local router receives a call from the remote router, it matches the remote router's CHAP name or PAP ID with a caller name in the caller resolution table. The router then activates the circuit assigned to that remote router.

If you enter a value for this parameter, you cannot enter a value for the Local Group parameter.

Instructions: Select a circuit from the Local Circuit List window. Site Manager automatically supplies the value for this parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.3

Parameter: Local Group

Path: Dialup > Caller Resolution Table > **Add** > Caller Name and Secret/Password

Default: 0

Options: 0 to 1000

Function: Identifies a previously configured demand circuit group. You assign this demand circuit group to a remote router, which you specify in the Caller Name parameter. When the local router receives a call from the remote router, it matches the remote router's CHAP name or PAP ID with a caller name in the caller resolution table. The router then activates a circuit from the demand circuit group assigned to that remote router.

Instructions: Enter the ID number of the demand circuit group that the router should use when it receives an incoming call. You assign this group to the remote router specified in the Caller Name parameter. Accept the default, 0, if you configure a individual local circuit.

If you enter a value for this parameter, you cannot enter a value for the Local Circuit parameter.

MIB Object ID: 1.3.6.1.4.1.18.3.5.9.2.3.1.6

Appendix B
Configuration Examples

This appendix provides examples of the following configurations:

Topic	Page
Dial-on-Demand with PPP	B-2
Dial-on-Demand Using ISDN Lines in a Frame Relay Network	B-10
Dial-on-Demand for an ISDN Network	B-14
Configuring a Hot Standby Circuit for a Frame Relay Network	B-21
Dial Backup with PPP or Standard on the Primary Line	B-24
Dial Backup over an ISDN Network	B-33

These examples include:

- A network illustration of the sample dial configuration
- Instructions for accessing and modifying parameters for proper configuration

This chapter assumes that you are familiar with the configuration procedures for dial services. For information about setting up WAN interfaces, see *Configuring WAN Line Services*.

Dial-on-Demand with PPP

In Figure B-1, routers 4 and 7 are connected via a demand line. The demand line uses PPP and V.25bis signaling.

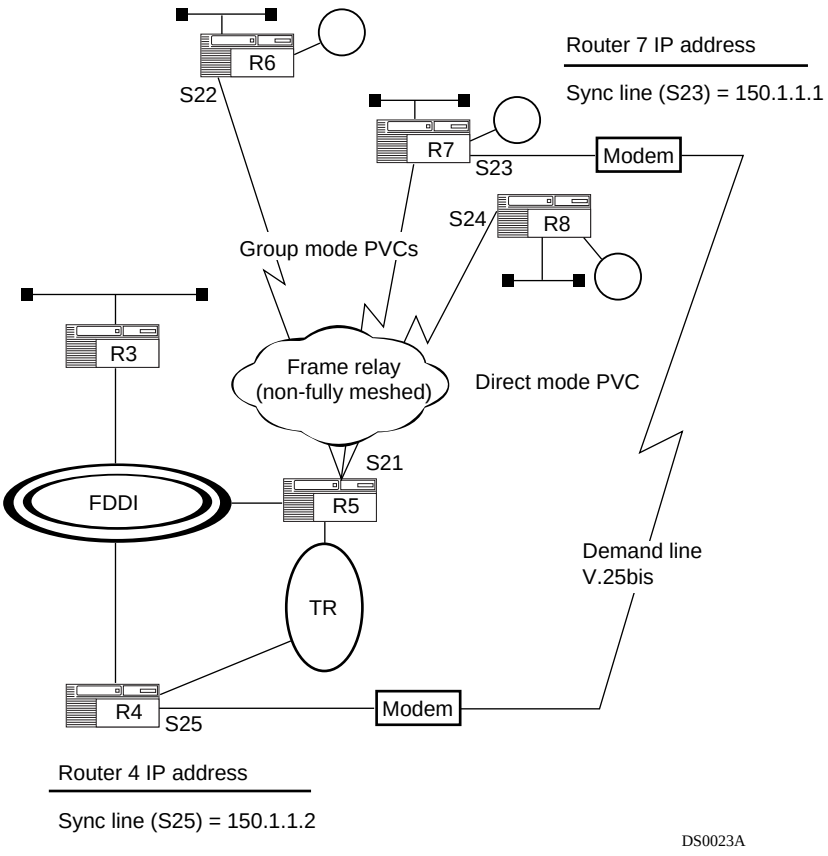

Figure B-1. Dial-on-Demand Configuration with PPP

You can configure the routers for this network using the BCC or Site Manager. Go to one of the following sections:

- Configuring Dial-on-Demand Using the BCC on page B-3
- Configuring Dial-on-Demand Using Site Manager on page B-6

Configuring Dial-on-Demand Using the BCC

To create the dial-on-demand configuration in Figure B-1 on page B-2, configure routers 4 and 7 as follows.

Configuration of Router 4

To create the dial-on-demand configuration in Figure B-1 on page B-2, configure router 4 as follows:

1. **Start the BCC and enter configuration mode.**

   ```
   bcc>config
   ```

2. **Create a dial object for serial interface on the octal sync module, slot 2, connector 5. PPP is the datalink protocol.**

   ```
   box# serial 2/5
   serial/2/5# media-type v25bis
   serial/2/5# dial
   dial/serial/2/5# box
   ```

3. **Create a demand pool with ID 2 then create a demand line on the serial interface you just created in step 2. Add this line to the demand pool.**

   ```
   box# demand-pool 2
   demand-pool/2# demand-line serial/2/5
   demand-line/2/serial/2/5# back
   ```

4. **Configure a demand circuit with a unique name that uses PPP and IP as the layer 2 and layer 3 protocols.**

   ```
   demand-pool/2# demand-circuit to-router7
   demand-circuit/to-router7# ppp
   ppp/to-router7# ip 150.1.1.2/255.255.255.0
   ip/150.1.1.2/255.255.255.0# back
   ```

   This circuit will use the demand line in demand pool 2. For this service to work properly, you also need to configure the outgoing phone list, the CHAP information, and the caller resolution table.

The router on the other end of the connection, router 7, will need to configured with the corresponding pieces so either side can activate the circuit.

5. **Define router 4's local CHAP name and secret so it can identify itself to the router 7.**

   ```
   ppp/to-router7# chap-name bln chap-secret west
   ```

6. **Set the connection mode for router 4 to collision-master to ensure that if both sides of the connection try to activate the circuit, router 7 will allow router 4 to initiate the call.**

   ```
   ppp/to-router7# connection-mode collision-master
   ppp/to-router7# back
   ```

7. **Specify the outgoing phone number. This is the phone number for router 7.**

   ```
   demand-circuit/to-router7# out-phone-number 4368989
   out-phone-number/to-router7/4368989# back
   ```

8. **Create a caller resolution entry so router 4 can identify router 7 and ensure router 7 is an authorized caller.**

   ```
   ppp/to-router7# caller-resolution remote7
   caller-resolution/remote-7# secret west
   caller-resolution/remote-7#
   ```

Configuration of Router 7

To create the dial-on-demand configuration in Figure B-1 on page B-2, configure router 7 as follows:

1. **Start the BCC and enter configuration mode:**

   ```
   bcc>config
   ```

2. **Create a dial object for serial interface slot 2, connector 3. PPP is the data link protocol.**

   ```
   box# serial 2/3
   serial/2/3# media-type v25bis
   serial/2/3# dial
   dial/serial/2/3# box
   ```

3. **Create a demand pool with ID 2, then create a demand line on the serial interface you just created in step 2. Add this line to the demand pool.**

   ```
   box# demand-pool 2
   demand-pool/2# demand-line serial/2/3
   demand-line/2/serial/2/3# back
   ```

4. **Configure a demand circuit with a unique name that uses PPP and IP as the layer 2 and layer 3 protocols.**

   ```
   demand-pool/2# demand-circuit to-router4
   demand-circuit/to-router4# ppp
   ppp/to-router4# ip 150.1.1.1/255.255.255.0
   ip/150.1.1.1/255.255.255.0# back
   ```

   This circuit will use the demand line in demand pool 2. For this service to work properly, you also need to configure the outgoing phone list, the CHAP information, and the caller resolution table.

5. **Define router 7's local CHAP name and secret so it can identify itself to router 4.**

   ```
   ppp/to-router4# chap-name bln chap-secret west
   ```

6. **Set the connection mode for router 7 to collision-slave to ensure that if both sides of the connection try to activate the circuit, router 7 will allow router 4 to initiate the call.**

   ```
   ppp/to-router4# connection-mode collision-slave
   ppp/to-router4# back
   ```

7. **Specify the outgoing phone number. This is the phone number for router 4.**

   ```
   ppp/to-router4# out-phone-number 4362323
   out-phone-number/to-router4/4362323# back
   ```

8. **Create a caller resolution entry so router 7 can identify router 4 and ensure that router 4 is an authorized caller.**

   ```
   ppp/to-router4# caller-resolution remote4
   caller-resolution/remote-7# secret west
   ```

Configuring Dial-on-Demand Using Site Manager

Routers 4 and 7 are BLNs with at least one synchronous link module installed.

To create the dial-on-demand configuration in Figure B-1 on page B-2, configure routers 4 and 7 according to the instructions in each of the following sections:

- Demand Pool Configuration on page B-6
- Demand Circuit Configuration on page B-7
- Outgoing Phone List Configuration on page B-8
- Caller Resolution Table Configuration on page B-9

Demand Pool Configuration

To configure a demand pool for routers 4 and 7, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Pools**.	The Demand Pools window opens.
3. Click on **Add**.	The Demand Pool Configuration window opens.
4. Set the **Pool ID** parameter to **1** then click on **OK**.	The Demand Lines Definition window opens.
5. Select an unconfigured COM connector.	The Choose WAN Serial Interface Type window opens.
6. Accept the default, **Sync**, and click on **OK**.	The Sync Line Media Type window opens.
7. Set the **Line Media Type** parameter to **V.25bis** and click on **OK**.	You return to the Demand Lines Definition window.
8. Choose **File > Exit**.	You return to the Demand Pools window.
9. Click on **Done**.	You return to the Configuration Manager window.

Demand Circuit Configuration

After you create a demand pool, configure a demand circuit for routers 4 and 7 by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Click on **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Click on **Add**.	Site Manager adds a demand circuit.
5. In the top left corner of the window, choose **Protocols.**	The Protocols menu opens.
6. Choose **Add/Delete**.	The Select Protocols menu opens.
7. Choose **IP** and click on **OK**.	The IP Configuration window opens.
8. Set the **IP Address** parameter as follows: • Router 4: **150.1.1.2** • Router 7: **150.1.1.1**	
9. Set the **Subnet Mask** parameter to **255.255.255.0** for both routers.	
10. Click on **OK**.	You return to the PPP Demand Circuits window.
11. Set the **CHAP Local Name** parameter as follows: • Router 4: **BLN1** (case-sensitive) • Router 7: **BLN2** (case-sensitive)	
12. Set the **CHAP Secret** parameter to **East** for both routers.	
13. Set the **Connection Mode** parameter as follows: • Router 4: **Collision Master** (default) • Router 7: **Collision Slave**	
14. Click on **Apply**.	Site Manager saves your changes.
15. Keep the PPP Demand Circuits window open and go to the next section.	

Outgoing Phone List Configuration

To configure the outgoing phone list on each router, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits window, choose **Phone Out**.	The Outgoing Phone List window opens.
2. Click on **Add**.	The Phone Number window opens.
3. Set the **Outgoing Phone Number** parameter as follows: • Router 4: **4362323** • Router 7: **4368989** Do not use hyphens or other nonnumeric characters.	
4. Click on **OK.**	You return to the Outgoing Phone List window.
5. Click on **Done**.	You return to the PPP Demand Circuits window.
6. Click on **Done**.	You return to the Demand Pools window.
7. Click on **Done**.	You return to the Configuration Manager window.

Caller Resolution Table Configuration

After configuring the demand circuits and the outgoing phone lists, configure the caller resolution table by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add**.	The Caller Name and Secret/Password window opens.
4. Set the **Caller Name** parameter as follows: • Router 4: **BLN2** • Router 7: **BLN1**	You return to the Caller Resolution Table window.
5. Set the **CHAP Secret** parameter to **East** for both routers.	
6. Click on **Done.**	The Local Circuit List window opens, which lists the demand circuit that you previously configured.
7. Select the demand circuit from the list and click on **OK**.	Site Manager sets this circuit as the local circuit. You then return to the Caller Resolution Table window.
8. Click on **Done**.	You return to the Configuration Manager window.

You have now completed a demand circuit configuration using PPP as the demand circuit protocol.

Dial-on-Demand Using ISDN Lines in a Frame Relay Network

Figure B-2 shows a frame relay network. In this network, BRI channels are used as dial-on-demand connections.

This example assumes the following:

- Both routers are ASNs.
- The ISDN switch type is BRI NI1.
- The switches can support dial lines.
- There is no incoming call filtering.
- Sending complete IEs are not used for call setup.
- The adaption rate is 64 Kb/s.
- CHAP is the PPP authentication protocol.
- IP is the only LAN protocol configured.
- Only one phone number and SPID are used. (BRI lines usually have two phone numbers and SPIDs.)

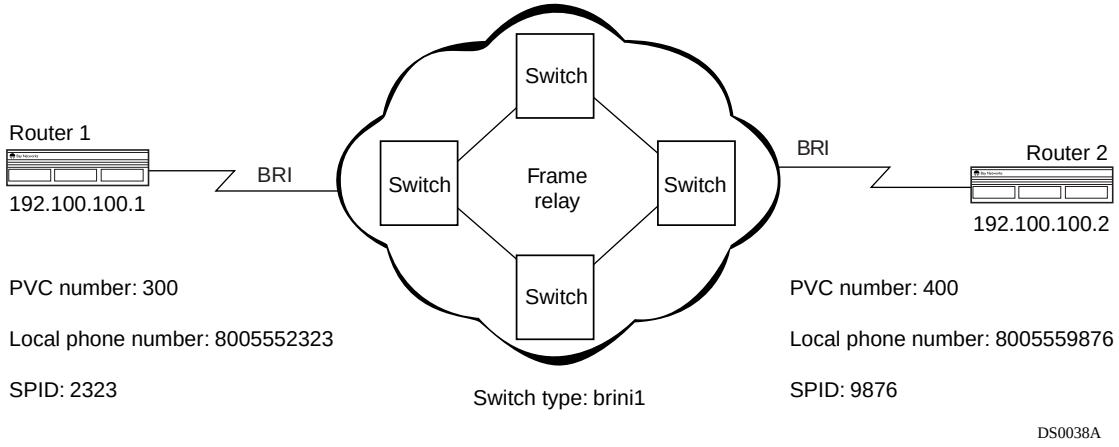

Figure B-2. Dial-on-Demand Across a Frame Relay Network

Configure routers 1 and 2 according to the instructions that follow.

Configuration of Router 1

To create the dial-on-demand configuration in Figure B-2 on page B-10, configure router 1 as follows:

1. **Start the BCC and enter configuration mode:**

   ```
   bcc>config
   ```

2. **Create a dial object for BRI interface slot 3, module 2, connector 1.**

   ```
   stack# bri 3/2/1 mode 2b+d
   bri/3/2/1# channel
   channel/3/2/1# dial
   dial/bri/3/2/1# back
   ```

3. **Specify a local phone number and SPID for the BRI interface.**

   ```
   channel/3/2/1# local-phone-number 8005552323
   local-phone-number/3/2/1/8005552323# spid 2323
   local-phone-number/3/2/1/8005552323# stack
   ```

4. **Modify the ISDN switch type from the default to BRI NI1.**

   ```
   stack# isdn-switch/3
   isdn-switch/3# switch-type brini1
   isdn-switch/3# stack
   ```

5. **Create a demand pool with ID 3 then create a demand line on the BRI interface you just created in step 2. Add this line to the demand pool.**

   ```
   stack# demand-pool 3
   demand-pool/3# demand-line bri/3/2/1
   demand-line/3/bri/3/2/1# back
   ```

6. **Configure a demand circuit with a unique name that uses frame relay with a service record containing one PVC. Configure IP for that PVC.**

   ```
   demand-pool/3# demand-circuit to-router2
   demand-circuit/to-router2# frame-relay
   frame-relay/to-router2# service service-to-asn
   service/service-to-asn# pvc 300
   pvc/to-router2/300# back
   service/service-to-asn# ip 192.100.100.2/255.255.255.0
   ip/192.100.100.2/255.255.255.0# back 3
   ```

This circuit will use the demand line in demand pool 3. For this service to work properly, you also need to configure the outgoing phone list. Frame relay circuits cannot answer incoming calls.

7. **Specify the outgoing phone number. This is the number for router 2.**

```
demand-circuit/to-router2# out-phone-number 8005559876
out-phone-number/to-router2/8005559876#
```

Configuration of Router 2

To create the dial-on-demand configuration in Figure B-2 on page B-10, configure router 2 as follows:

1. **Start the BCC and enter configuration mode:**

```
bcc>config
```

2. **Create a dial object for BRI interface slot 1, module 2, connector 2. PPP is the data link protocol.**

```
stack# bri 1/2/2 mode 2b+d
bri/1/2/2# channel
channel/1/2/2# dial
dial/bri/1/2/2# back
```

3. **Specify a local phone number and SPID for the BRI interface.**

```
channel/1/2/2# local-phone-number 8005559876
local-phone-number/1/2/2/8005559876# spid 9876
local-phone-number/1/2/2/8005559876# stack
```

4. **Modify the ISDN switch type from the default to BRI NI1.**

```
stack# isdn-switch/1
isdn-switch/1# switch-type brini1
isdn-switch/1# stack
```

5. **Create a demand pool with ID 3 then create a demand line on the BRI interface you just created in step 2. Add this line to the demand pool.**

```
stack# demand-pool 3
demand-pool/3# demand-line bri/1/2/2
demand-line/3/bri/1/2/2# back
```

6. **Configure a demand circuit with a unique name that uses frame relay with a service record containing one PVC. Configure IP for that PVC.**

```
demand-pool/3# demand-circuit to-router1
demand-circuit/to-router1# frame-relay
frame-relay/to-router1# service service-to-r1
service/service-to-r1# pvc 400
pvc/to-router1/400# back
service/service-to-r1# ip 192.100.100.1/255.255.255.0
ip/192.100.100.1/255/255/255.0# back 3
```

   This circuit will use the demand line in demand pool 3. For this service to work properly, you also need to configure the outgoing phone list. Frame relay circuits cannot answer incoming calls. Consequently,

7. **Specify the outgoing phone number. This is the number of router 1.**

```
demand-circuit/to-router1# out-phone-number 8005552323
out-phone-number/to-router1/8005552323#
```

Dial-on-Demand for an ISDN Network

Figure B-3 illustrates dial-on-demand service configured for an ISDN network. In this configuration:

- The BLN is using a dual port MCT1 link module (port 2) for its PRI interface.
- The ISDN switch type is PRI 5ESS.
- The IP static route configurations are not listed for the Ethernet interfaces. (Typically, there would be static routes.)

This example assumes the following:

- All BRI connections use a National ISDN 1 (NI1) switch.
- There is no incoming call filtering.
- Sending complete IEs are not used for call setup.
- The adaption rate is 64 Kb/s.
- CHAP is the PPP authentication protocol.
- IP is the only LAN protocol configured.
- The Ethernet segments shown in the network illustration are not configured.
- Only one phone number and SPID are used. (BRI lines usually have two phone numbers and SPIDs.)

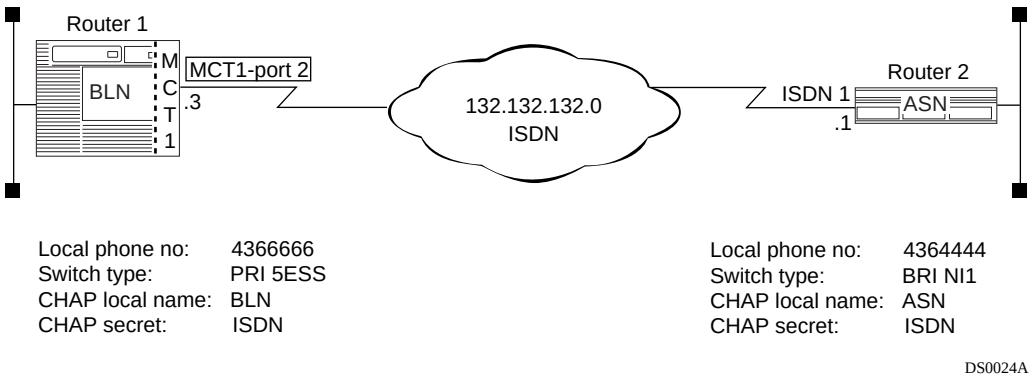

Figure B-3. Dial-on-Demand for an ISDN Network

Configuration of Routers 1 and 2

To create the dial-on-demand configuration in Figure B-3 on page B-14, configure routers 1 and 2 according to the instructions in the following sections:

- Port Application Mode Configuration on page B-15
- Demand Pool Configuration on page B-16
- Demand Circuit Configuration on page B-17
- Outgoing Phone List Configuration on page B-18
- Protocol Configuration on page B-19
- Caller Resolution Table Configuration on page B-19
- Local Phone Number Configuration on page B-20

Port Application Mode Configuration

Begin by setting the Port Application Mode parameter for interfaces on routers 1 and 2. These interfaces will become part of the demand pool.

Site Manager Procedure	
You do this	**System responds**
1. Router 1: In the Configuration Manager window, choose the **MCT1-2** connector on the MCT1 link module. Router 2: In the Configuration Manager window, choose the **ISDN1** connector on the ISDN/BRI net module.	The Port Application window opens.
2. Set the **Port Application Mode** as follows then click on **OK**: • Router 1: **PRI** • Router 2: **Dialup - 2B+D** (default)	For router 1 (the PRI interface), the Clock Parameters window opens.
3. For router 1 only, set the **Primary Clock** parameter to **Port 2 Ext Loop** then click on **OK**.	The Port Parameters window opens.
4. Accept the default values for all parameters by clicking on **OK**.	The PRI Logical Lines timeslots window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Choose **Select All** then click on **OK**.	You return to the PRI Logical Lines window.
6. Accept the default MTU size, click on **Apply**, then click on **OK**.	
7. Click on **Done**.	You return to the Configuration Manager window.

If you are using selective PRI service (that is, some B channels are blocked), the timeslots that you configure as B channels should be the same channels assigned by the switch provider. For example, if the provider assigns you channels 1 to 10, configure timeslots 1 to 10 as B channels.

Demand Pool Configuration

After configuring ISDN interfaces, these lines can be included in a demand pool. To configure a demand pool, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Pools**.	The Demand Pools window opens.
3. Click on **Add**.	The Demand Pool Configuration window opens.
4. Set the **Pool ID** parameter to **1** then click on **OK**.	The Demand Lines Definition window opens.
5. Click on either the **MCT1-2** connector (router 1) or the **ISDN1** connector (router 2).	The ISDN Switch Configuration window opens.
6. Set the **Switch Type** parameter as follows: • Router 1: **PRI 5ESS** • Router 2: **BRI NI1**	The ISDN Logical Lines window opens.
7. Accept the defaults, then click on **OK**.	You return to the Demand Lines Definition window.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
8. Choose **File > Exi**t.	You return to the Demand Pools window.
9. Click on **Done**.	You return to the Configuration Manager window.

Demand Circuit Configuration

After you configure the demand pool, the next step is to configure demand circuits:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Demand Circuits**.	The Demand Pools window opens.
3. Choose **PPP Circuits**.	The PPP Demand Circuits window opens.
4. Choose **Add**.	Site Manager adds a demand circuit.
5. Set the **CHAP Local Name** parameter as follows: • Router 1: **BLN** (case-sensitive) • Router 2: **ASN** (case-sensitive)	
6. Set the **CHAP Secret** parameter to **ISDN** for routers 1 and 2.	
7. Set the **Connection Mode** parameter as follows: • Router 1: **Collision Master** (default) • Router 2: **Collision Slave**	
8. Click on **Apply**.	
9. Keep the PPP Demand Circuits window open and go to the next section.	

Outgoing Phone List Configuration

To configure the outgoing phone list, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits window, choose **Phone Out**.	The Outgoing Phone List window opens.
2. Click on **Add**.	The Phone Number window opens.
3. Set the **Outgoing Phone Number** parameter as follows: • Router 1: **4364444** • Router 2: **4366666** Do not use hyphens or other nonnumeric characters.	
4. Click on **OK**.	You return to the Outgoing Phone List window, with the new phone number displayed.
5. Click on **Done**.	You return to the PPP Demand Circuits window.
6. Keep the PPP Demand Circuits window open and go to the next section.	

The ISDN Numbering Plan and ISDN Numbering Type parameters default to the correct settings based on the switch type you configured. Do not change these parameters unless you receive explicit instructions from your service provider.

Protocol Configuration

From the PPP Demand Circuits window, select the protocol for this configuration by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the PPP Demand Circuits window, click on **Protocols** in the top left corner.	The Protocols menu opens.
2. Choose on **Add/Delete**.	The Select Protocols menu opens.
3. Choose **IP** and click on **OK**.	The IP Configuration window opens.
4. Set the **IP Address** parameter as follows: • Router 1: **132.132.132.3** • Router 2: **132.132.132.1**	
5. Set the **Subnet Mask** parameter to **255.255.255.0** for both routers.	
6. Click on **OK**.	You return to the PPP Demand Circuits window.
7. Click on **Done**.	You return to the Demand Pools window.
8. Click on **Done**.	You return to the Configuration Manager window.

Caller Resolution Table Configuration

After configuring the demand circuits, configure the caller resolution table by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add**.	The Caller Name and Secret/Password window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
4. Set the **Caller Name** parameter as follows: • Router 1: **ASN** • Router 2: **BLN**	You return to the Caller Resolution Table window.
5. Set the **CHAP Secret** parameter to **ISDN** for both routers.	
6. Click on **Done.**	The Local Circuit List window opens, which lists the demand circuit that you configured.
7. Select the demand circuit from the list then click on **OK**.	Site Manager sets this circuit as the local circuit. You return to the Caller Resolution Table window.
8. Click on **Done**.	You return to the Configuration Manager window.

Local Phone Number Configuration

Finally, configure each router's phone number by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Local Phone Numbers.**	The ISDN Local Phone Lines window opens.
3. Click on **Local Phones**.	The ISDN Local Phone Numbers window opens.
4. Click on **Add**.	The Phone Number window opens.
5. Set the **Directory Number** parameter as follows: • Router 1: **4366666** • Router 2: **4364444**	
6. For router 2 only, set the **SPID** parameter to **5084364440000**.	

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
7. Click on **OK**.	You return to the ISDN Local Phone Numbers window.
8. Click on **Done**.	You return to the ISDN Local Phone Lines window.
9. Click on **Done**.	You return to the Configuration Manager window.

Configuring a Hot Standby Circuit for a Frame Relay Network

Figure B-4 shows a leased frame relay connection between routers 1 and 2. To ensure that data always has a path to its destination, a hot standby circuit is created to back up the leased connection if it fails. Frame relay is the protocol for the leased primary circuit. PPP is the protocol for the hot standby circuit.

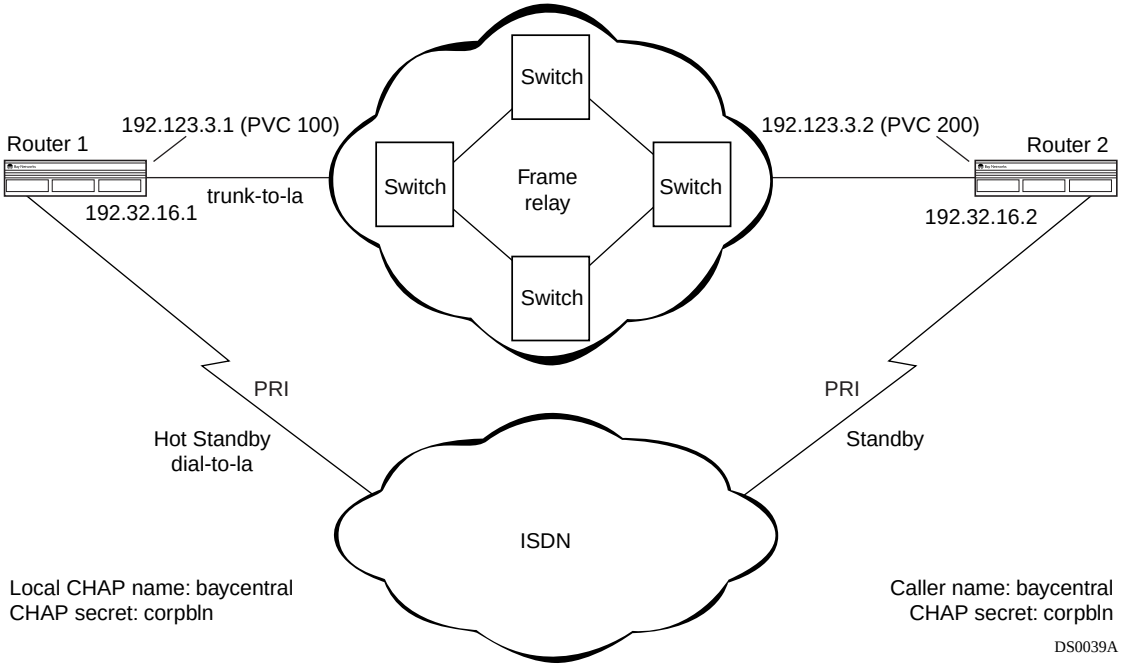

Figure B-4. Hot Standby Connections in a Frame Relay Network

Configuration of Router 1

To configure the network in Figure B-4, configure router 1 as follows:

1. **Configure the frame relay leased primary circuit.**

   ```
   box# serial 2/1
   serial/2/1# frame-relay
   frame-relay/2/1# service trunk-to-la
   service/trunk-to-la# pvc 100
   pvc/2/1/100# back
   service/trunk-to-la# ip 192.123.3.1/255.255.255.0
   ip/192.123.3.1/255.255.255.0# box
   ```

2. **Configure a PPP demand circuit.**

   ```
   box# mct1 5/1; pri
   pri/5/1# dial
   dial/pri/5/1# box
   box# demand-pool 7
   demand-pool/7# demand-line pri/5/1
   demand-line/7/pri/5/1# back
   demand-pool/7# demand-circuit dial-to-la
   demand-circuit/dial-to-la# ppp
   ppp/dial-to-la# ip 192.32.16.1/255.255.255.0
   ip/192.32.16.1/255.255.255.0# back
   ```

3. **For the demand circuit to operate as a hot standby circuit, the connection mode must be collision-master. Also, set the outgoing phone number for router 2.**

   ```
   ppp/dial-to-la# connection-mode collision-master
   ppp/dial-to-la# back
   demand-circuit/dial-to-la# out-phone-number 9162222
   out-phone-number/dial-to-la/9162222# back
   ```

4. **Define router 1's local CHAP name and secret so it can identify itself to router 2.**

   ```
   ppp/dial-to-la# chap-name baycentral chap-secret corpbln
   ```

5. **Navigate to the leased frame relay PVC service record and assign the hot standby circuit, dial-to-la, to this leased interface.**

   ```
   box# serial 2/1; frame-relay; service trunk-to-la
   service/trunk-to-la# hot-standby dial-to-la
   ```

The hot standby circuit, dial-to-la, is now assigned to the leased interface trunk-to-la. If the leased interface fails, dial-to-la will activate and data will use this circuit until the primary has recovered and the configured failback time has been reached.

Configuration of Router 2 (Normal Standby Circuit)

Router 2 is the other end of the connection. Because router 1 is configured with a hot standby circuit, router 2 must be configured with a normal standby circuit to receive calls from router 1.

To configure the network in Figure B-4 on page B-21, configure router 2 as follows:

1. **Configure a PPP demand circuit.**

   ```
   box# mct1 3/1;pri
   pri 3/1# dial
   dial/pri/3/1# box
   box# demand-pool 10
   demand-pool/10# demand-line pri/3/1
   demand-line/10/pri/3/1# back
   demand-pool/10# demand-circuit from-boston
   demand-circuit/from-boston# ppp
   ppp/from-boston# ip 192.32.16.2/255.255.255.0
   ip/192.32.16.2/255.255.255.0# back
   ```

2. **Set the standby-mode parameter so the demand circuit operates as a normal standby circuit.**

   ```
   ppp/from-boston# standby-mode standby-normal
   ```

3. **For the demand circuit to operate as a normal standby circuit, set the connection-mode parameter to collision slave.**

   ```
   ppp/from-boston# connection-mode collision-slave
   ppp/from-boston# back
   ```

4. **Configure the caller resolution table so this router can verify the identity of router 1, when placing the incoming call.**

   ```
   demand-circuit/from-boston# caller-resolution baycentral secret corpbln
   ```

Dial Backup with PPP or Standard on the Primary Line

Figure B-5 shows routers 1 and 2 connected via a synchronous line running PPP and using Raise DTR signaling. This connection can also use Nortel Networks Standard. You designate this synchronous connection as a primary connection, so that if it fails, the router provides a dial backup connection.

You can configure the routers for this network using the BCC or Site Manager. Go to one of the following sections:

- Configuring Dial Backup Using the BCC on page B-25
- Configuring Dial Backup Using Site Manager on page B-28

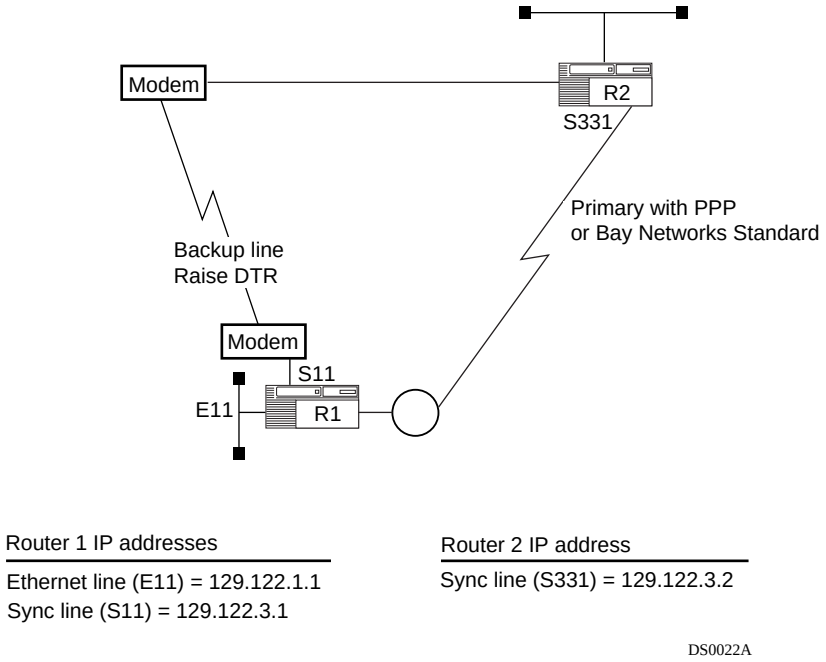

Figure B-5. Dial Backup Configuration with PPP

Configuring Dial Backup Using the BCC

The following section explains how to configure dial backup with PPP on the primary line using the BCC (Figure B-5 on page B-25). You would follow similar steps to configure Nortel Networks Standard on the primary line.

Configuration of Router 1

To create the dial backup configuration in Figure B-5 on page B-24, configure router 1 as follows:

1. **Enter configuration mode:**

   `bcc>`**config**

2. **Configure a leased synchronous interface with PPP on serial interface slot 1, connector 1:**

   `box#` **serial 1/1**
   `serial/1/1#` **ppp**
   `ppp/1/1#` **ip 129.122.3.1/255.255.255.0**
   `ip/192.122.3.1/255.255.255.0#` **box**

3. **Create a dial object for serial interface slot 5, connector 1. PPP is the default protocol.**

   `box#` **serial 5/1**
   `serial/5/1#` **dial**
   `dial/serial/5/1#` **box**

4. **Create a backup pool with pool ID 22, then create a backup line on the serial interface you created in step 3. Add this line to the backup pool.**

   `box#` **backup-pool 22**
   `backup-pool/22#` **backup-line serial/5/1**

5. **Configure a backup circuit for the leased circuit ppp/1/1. Also, set the backup mode to initiator.**

   `backup-line/22/serial/5/1#` **cwc; serial 1/1; ppp**
   `ppp/1/1#` **backup-circuit pool-id 22 backup-mode initiator**

   This circuit uses backup lines configured in the backup pool 22. The **backup-mode** parameter is set to initiator, so router 2's backup-mode must be set to receiver for proper operation.

6. **Define the router's local CHAP name and secret so it can identify itself to the remote router.**

   ```
   backup-circuit/22/1/1# chap-name bln chap-secret west
   ```

   This router, the initiator router, does not require a caller resolution table. router 1 initiates calls to router 2, it does not receive them; therefore, router 1 does not need to verify router 2's identity. In contrast, router 1 must have a CHAP name and secret configured, which it then places in the call setup message to identify itself to router 2.

7. **Specify the outgoing phone number for remote router 2.**

   ```
   backup-circuit/22/1/1# out-phone-number phone-number 4362222
   out-phone-number/backup/22/1/1/4362222#
   ```

Optional Schedule Configuration for Router 1

You can specify a schedule for the backup circuit's availability. By default, the backup circuit is available all the time.

Assume that you are at the out-phone-number prompt from the previous section. To specify a different schedule:

1. **From the out-phone-number prompt, go back to the backup-circuit prompt.**

   ```
   out-phone-number/backup/22/1/1/9162222# back
   backup-circuit/22/1/1/#
   ```

2. **Specify the schedule.**

   ```
   backup-circuit/22/1/1/# schedule days weekend start-time 1000 end-time 2100
   ```

Configuration of Router 2

To create the dial backup configuration in Figure B-5 on page B-24, configure router 2 as follows:

1. **Enter configuration mode:**

   ```
   bcc>config
   ```

2. **Configure a leased synchronous interface on an ASN with PPP on serial interface slot 3, module 3, connector 1.**

   ```
   stack# serial 3/3/1
   serial/3/3/1# ppp
   ppp/3/3/1# ip 129.122.3.2/255.255.255.0
   ip/192.122.3.2/255.255.255.0# stack
   ```

3. **Create a dial object for serial interface slot 2, module 1, connector 1. PPP is the default protocol.**

   ```
   stack# serial 2/1/1
   serial/2/1/1# dial
   dial/serial/2/1/1# stack
   ```

4. **Create a backup pool with pool ID 24, then create a backup line on the serial interface you created in step 3. Add this line to the pool.**

   ```
   stack# backup-pool 24
   backup-pool/24# backup-line serial/2/1/1
   ```

5. **Configure a backup circuit for the leased circuit ppp/3/3/1. Also, set the backup-mode parameter to receiver.**

   ```
   backup-line/24/serial/2/1/1# stack; serial 3/3/1; ppp
   ppp/3/3/1# backup-circuit pool-id 24 backup-mode receiver
   ```

   This circuit uses backup lines configured in the backup pool 24. The **backup-mode** parameter is set to receiver, the other router's backup-mode must be set to initiator for proper operation.

6. **Configure a caller resolution table entry so when this router receives a call from router 1, it can verify router 1's identity.**

   ```
   backup-circuit/24/3/3/1# caller-resolution caller-name bln secret west
   caller-resolution/bln# back
   ```

7. **Accept the default circuit schedule.**

Configuring Dial Backup Using Site Manager

The configuration in Figure B-5 on page B-25 shows dial backup service for a PPP primary line.

To create the dial backup configuration using Site Manager, configure routers 1 and 2 according to the instructions in the following sections:

- Leased Interface Configuration on page B-28
- Backup Pool Configuration on page B-29
- Backup Circuit Configuration on page B-30
- Outgoing Phone List Configuration on page B-31
- Caller Resolution Table Configuration on page B-31

Leased Interface Configuration

To create the dial backup configuration shown in Figure B-5 on page B-24, first configure the leased interface that will use dial backup service.

Configure router 1 with a leased synchronous interface named S11 as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, select a COM port.	The Add Circuit window opens.
2. In the **Circuit Name** field, enter **S11** and click on **OK**.	The WAN Protocols menu opens.
3. Choose **PPP** or **Standard**.	The Select Protocols menu opens.
4. Choose **IP** and click on **OK**.	The IP Configuration window opens.
5. Set the **IP Address** parameter to **129.122.3.1** and click on **OK**.	You return to the Configuration Manager window.

Configure router 2 with a leased, synchronous interface named S331 as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, select a COM port.	The Add Circuit window opens.
2. Enter **S331** in the **Circuit Name** field then click on **OK**.	The WAN Protocols menu opens.
3. Choose **PPP** or **Standard**.	The Select Protocols menu opens.
4. Choose **IP** and click on **OK**.	The IP Configuration window opens.
5. Set the **IP Address** parameter to **129.122.3.2** then click on **OK**.	You return to the Configuration Manager window.

Backup Pool Configuration

To configure the backup pools for each router, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Pools**.	The Backup Pools window opens.
3. Click on **Add**.	The Backup Pool Configuration window opens.
4. Set the **Pool ID** parameter to **1** then click on **OK**.	The Backup Lines Definition window opens.
5. Choose a COM port to include in the line pool.	The Choose WAN Serial Interface Type window opens.
6. Click on **OK** to accept the parameter default, **Sync**.	The Sync Line Media Type window opens.
7. Click on **OK** to accept the parameter default values.	You return to the Backup Lines Definition window.
8. Choose **File > Exit**.	You return to the Backup Pools window.
9. Click on **Done**.	You return to the Configuration Manager window.

Backup Circuit Configuration

After you configure the backup pool, configure the backup circuits on each router by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP**.	The Primary Circuit Definition window opens, which lists the leased circuits that you configured.
4. Select a leased circuit name and click on **Cct Type**.	The Circuit Options window opens.
5. Set the **Circuit Type** parameter to **Primary** for both routers.	
6. Set the **Backup Pool ID** parameter to **1** for both routers, then click on **OK**.	You return to the Primary Circuit Definition window.
7. Set the **Backup Mode** parameter as follows: • Router 1: **Master** (default) • Router 2: **Slave**	
8. For router 1 only, set the **CHAP Local Name** parameter to **BLN**.	
9. For router 1 only, set the **CHAP Secret** parameter to **West**.	
10. Click on **Apply**.	Site Manager saves your changes.
11. Keep the Primary Circuit Definition window open and go to the next section.	

Remember that you do not actually configure a backup circuit; designate a leased circuit as a primary circuit. If this circuit fails, the router provides a backup circuit that adopts the configuration of the primary circuit.

Outgoing Phone List Configuration

From the Primary Circuit Definition window, configure the outgoing phone list on each router by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Primary Circuit Definition window, select a circuit.	
2. Click on **Phone Out**.	The Outgoing Phone List window opens.
3. Click on **Add.**	The Phone Number window opens.
4. Set the **Outgoing Phone Number** parameter as follows: • Router 1: **4362222** • Router 2: **4368888**	
5. Click on **OK**.	You return to the Outgoing Phone List window.
6. Click on **Done**.	You return to the Primary Circuit Definition window.
7. Click on **Done**.	You return to the Configuration Manager window.

Caller Resolution Table Configuration

Router 1, the master router, does not require a caller resolution table. Router 1 initiates calls to router 2, it does not receive them; therefore, router 1 does not need to verify router 2's identity. In contrast, router 1 must have a CHAP name and secret that it places in the call setup message to identify itself to router 2.

Router 2, the slave router, does require a caller resolution table entry. Router 2 receives calls from router 1 and must identify the incoming caller. After configuring the primary and backup circuits, you must configure the caller resolution table on router 2.

To configure router 2's caller resolution table, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add**.	The Caller Name and Secret/Password window opens.
4. For router 2 only, set the **Caller Name** parameter to **BLN**.	
5. For router 2 only, set the **CHAP Secret** parameter to **West**.	
6. Click on **OK**.	The Local Circuit List window opens, which lists the demand circuit that you previously configured.
7. Select the demand circuit from the list, then click on **OK**.	Site Manager sets this circuit as the local circuit. You return to the Caller Resolution Table window.
8. Click on **Done**.	You return to the Configuration Manager window.

Dial Backup over an ISDN Network

Figure B-6 shows dial backup service over an ISDN network. In this configuration, the primary circuit is using PPP. If the primary circuit uses Nortel Networks Standard or frame relay as the WAN protocol, the procedure is the same as configuring PPP.

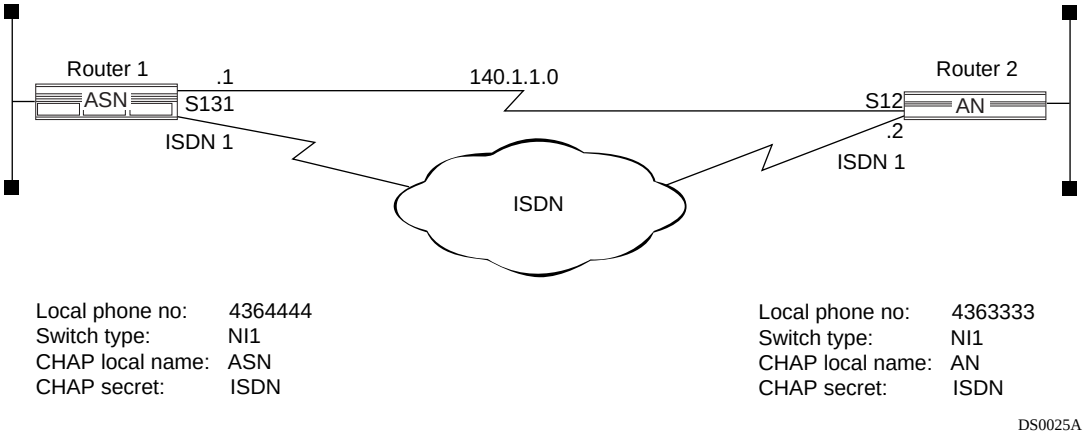

Figure B-6. Dial Backup over an ISDN Network

This ISDN example assumes the following:

- All BRI connections use a National ISDN 1 (NI1) switch.
- There is no incoming call filtering.
- Sending complete IEs are not used for call setup.
- The adaption rate is 64 Kb/s.
- CHAP is the PPP authentication protocol.
- IP is the only LAN protocol configured.
- The Ethernet segments shown in the network illustration are not configured.
- Only one phone number and SPID are used. (BRI lines usually have two phone numbers and SPIDs.)

You can configure the routers for this network using the BCC or Site Manager. For instructions, go to one of the following sections:

- Configuring Dial Backup Using the BCC on page B-34
- Configuring Dial Backup Using Site Manager on page B-37

Configuring Dial Backup Using the BCC

To create the dial backup over ISDN network configuration in Figure B-6 on page B-33, configure routers 1 and 2 as follows.

Configuration of Router 1

1. **Enter configuration mode.**

   bcc>**config**

2. **Configure a leased serial interface with PPP on serial interface slot 1, module 3, connector 1.**

   stack# **serial 1/3/1**
   serial/1/3/1# **ppp**
   ppp/1/3/1# **ip 140.1.1.1/255.255.255.0**
   ip/140.1.1.1/255.255.255.0# **stack**

3. **Configure a BRI object for this serial interface and configure a B channel.**

   stack# **bri 3/2/1 mode 2b+d**
   bri/3/2/1# **channel**

4. **Create a dial object for the B channel.**

   channel/3/2/1# **dial**
   dial/bri/3/2/1# **back**

5. **Specify the local phone number that this router will include when placing a call. In addition, specify the SPID, because the switch conforms to the National standard.**

   channel/3/2/1# **local-phone-number phone-number 4364444**
   local-phone-number/3/2/1/4364444# **spid 50843644440000**
   local-phone-number/3/2/1/4364444# **stack**

6. **Specify the ISDN switch type.**

   ```
   stack# isdn-switch/3
   isdn-switch/3# switch-type brini1
   isdn-switch/3# stack
   ```

7. **Create a backup pool with pool ID 22, then create a backup line on the serial interface you created in step 2. Add this line to the pool.**

   ```
   stack# backup-pool 22
   backup-pool/22# backup-line bri/3/2/1
   ```

8. **Configure a backup circuit for the leased circuit ppp/1/3/1. Also, set the backup-mode parameter to initiator.**

   ```
   backup-line/22/bri/3/2/1# stack; serial 1/3/1; ppp
   ppp/1/3/1# backup-circuit pool-id 22 backup-mode initiator
   ```

   This circuit uses backup lines configured in backup pool 22. The backup mode is set to initiator, so the other router's **backup-mode** parameter must be set to receiver for proper operation.

9. **Define the router's local CHAP name and secret so it can identify itself to the remote router.**

   ```
   backup-circuit/22/1/3/1# chap-name asn chap-secret isdn
   ```

   This router, the initiator router, does not require a caller resolution table. router 1 initiates calls to router 2, it does not receive them; therefore, router 1 does not need to verify router 2's identity. In contrast, router 1 must have a CHAP name and secret configured, which it then places in the call setup message to identify itself to router 2.

10. **Specify the outgoing phone number for the remote router.**

    ```
    backup-circuit/22/1/3/1# out-phone-number phone-number 4363333
    out-phone-number/backup/22/1/3/1/4363333#
    ```

Configuration of Router 2

To create the dial backup configuration in Figure B-6 on page B-33, configure router 2 as follows:

1. **Configure a leased synchronous interface on an AN with PPP on serial interface slot 1, connector 2.**

   ```
   box# serial 1/2
   serial/1/2# ppp
   ppp/3/3/1# ip 140.1.1.2/255.255.255.0
   ip/140.1.1.2/255.255.255.0# box
   ```

2. **Configure a BRI object for this ISDN interface and configure a B channel.**

   ```
   box# bri 1/1 mode 2b+d
   bri/1/1# channel
   ```

3. **Create a dial object for the B channel.**

   ```
   channel/1/1# dial
   dial/bri/1/1# back
   ```

4. **Specify the local phone number that this router will include when placing a call. In addition, specify the SPID, because the switch conforms to the National standard.**

   ```
   channel/1/1# local-phone-number 4363333
   local-phone-number/1/1/4363333# spid 50843633330000
   local-phone-number/1/1/4363333# box
   ```

5. **Specify the ISDN switch type.**

   ```
   box# isdn-switch/1
   isdn-switch/1# switch-type brini1
   isdn-switch/1# box
   ```

6. **Create a backup pool with pool ID 24, then create a backup line on the ISDN interface you created in step 1. Add this line to the pool.**

   ```
   box# backup-pool 24
   backup-pool/24# backup-line bri/1/1
   ```

7. **Configure a backup circuit for the leased circuit on ppp/1/2. Also, set the backup-mode parameter to receiver.**

   ```
   backup-line/24/bri/1/1# box; serial 1/2; ppp
   ppp/1/2# backup-circuit pool-id 24 backup-mode receiver
   ```

This circuit uses backup lines configured in backup pool 24. The **backup-mode** is set to receiver, so the other router's **backup-mode** parameter must be set to initiator for proper operation.

8. **Configure a caller resolution table entry so that when this router receives a call from router 1, it can verify router 1's identity.**

```
backup-circuit/24/1/2# caller-resolution caller-name asn secret isdn
caller-resolution/asn#
```

Configuring Dial Backup Using Site Manager

The following sections show how to configure dial backup over an ISDN network using Site Manager.

- Port Application Mode Configuration on B-39
- Backup Pool Configuration on page B-29
- Backup Circuit Configuration on page B-40
- Outgoing Phone List Configuration on page B-41
- Caller Resolution Table Configuration on page B-41
- Local Phone Number Configuration on page B-43

To create the dial backup configuration in Figure B-6 on page B-33, first configure the leased interface that will use dial backup service.

Leased Interface Configuration

Configure router 1 with a leased synchronous interface named S131 as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, select a COM port.	The Add Circuit window opens.
2. In the **Circuit Name** field, enter **S131** then click on **OK**.	The WAN Protocols menu opens.
3. Choose **PPP**.	The Select Protocols menu opens.
4. Choose **IP** and click on **OK**.	The IP Configuration window opens.

(continued)

Site Manager Procedure *(continued)*	
You do this	**System responds**
5. Set the **IP Address** parameter to **140.1.1.1**	
6. Set the **Subnet Mask** parameter to **255.255.255.0**.	
7. Click on **OK**.	You return to the Configuration Manager window.

Configure router 2 with a leased synchronous interface named S12 as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, select a COM port.	The Add Circuit window opens.
2. In the **Circuit Name** field, enter **S12,** then click on **OK**.	The WAN Protocols menu opens.
3. Choose **PPP**.	The Select Protocols menu opens.
4. Choose **IP** and click on **OK**.	The IP Configuration window opens.
5. Set the **IP Address** parameter to **140.1.1.2.**	
6. Set the **Subnet Mask** parameter to **255.255.255.0**.	
7. Click on **OK**.	You return to the Configuration Manager window.

Configure routers 1 and 2 according to the sections that follow.

Port Application Mode Configuration

Configure the port application mode by completing the following tasks for both routers 1 and 2.

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose the **ISDN1** connector on the ISDN/ BRI net module.	The Port Application window opens.
2. Accept the default for the **Port Application Mode** parameter (Dialup - 2B+D) then click on **OK**.	You return to the Configuration Manager window.

Backup Pool Configuration

Configure a backup pool for each router as follows:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Pools**.	The Backup Pools window opens.
3. Click on **Add**.	The Backup Pool Configuration window opens.
4. Set the **Pool ID** parameter to **1** then click on **OK**.	The Backup Lines Definition window opens.
5. Choose the ISDN1 port that you configured as a BRI interface.	The ISDN Switch Configuration window opens.
6. Set the **Switch Type** parameter to **BRI NI1** for both routers, then click on **OK**.	The ISDN Logical Lines window opens.
7. Click on **OK to** accept the parameter default values.	You return to the Backup Lines Definition window.
8. Choose **File > Exit**.	You return to the Backup Pools window.
9. Click on **Done**.	You return to the Configuration Manager window.

Backup Circuit Configuration

After you configure the backup pool, configure the backup circuits for each router by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Backup Circuits**.	The Backup Circuits menu opens.
3. Choose **PPP**.	The Primary Circuit Definition window opens, which lists the leased circuits that you configured.
4. Select a leased circuit name and click on **Cct Type**.	The Circuit Options window opens.
5. Set the **Circuit Type** parameter to **Primary** for both routers.	
6. Set the **Pool ID** parameter to **1** for both routers, then click on **OK**.	You return to the Primary Circuit Definition window.
7. Set the **Backup Mode** parameter as follows: • Router 1: **Master** (default) • Router 2: **Slave**	
8. For router 1 only, set the **CHAP Local Name** parameter to **ASN**.	
9. For router 1 only, set the **CHAP Secret** parameter to **ISDN**.	
10. Click on **Apply**.	Site Manager saves your changes.
11. Keep the Primary Circuit Definition window open and go to the next section.	

Remember that you do not actually configure a backup circuit; you designate a leased circuit as a primary circuit. If this circuit fails, the router provides a backup circuit that adopts the configuration of the primary circuit.

Outgoing Phone List Configuration

From the Primary Circuit Definition window, configure the outgoing phone list for each router by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Primary Circuit Definition window, select a circuit.	
2. Click on **Phone Out**.	The Outgoing Phone List window opens.
3. Click on **Add.**	The Phone Number window opens.
4. Set the **Outgoing Phone Number** parameter as follows: • Router 1: **4363333** • Router 2: **4364444** Do not use hyphens or other nonnumeric characters.	
5. Click on **OK**.	You return to the Outgoing Phone List window.
6. Click on **Done**.	You return to the Primary Circuit Definition window.
7. Click on **Done**.	You return to the Configuration Manager window.

The ISDN Numbering Plan and ISDN Numbering Type parameters default to the correct values based on the switch type you configured. Do not change these parameters unless you receive explicit instructions from your service provider.

Caller Resolution Table Configuration

Router 1, the master router, does not require a caller resolution table. Router 1 initiates calls to router 2, it does not receive them; therefore, router 1 does not need to verify router 2's identity. In contrast, router 1 must have a CHAP name and secret that it places in the call setup message to identify itself to router 2.

Router 2, the slave router, requires a caller resolution table entry. Router 2 receives calls from router 1 and must identify the incoming caller. After configuring the backup circuits, you must configure the caller resolution table on router 2.

To configure router 2's caller resolution table, complete the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Caller Resolution Table**.	The Caller Resolution Table window opens.
3. Click on **Add**.	The Caller Name and Secret/Password window opens.
4. For router 2 only, set the **Caller Name** parameter to **ASN**.	
5. For router 2 only, set the **CHAP Secret** parameter to **ISDN**.	
6. Click on **OK**.	The Local Circuit List window opens, which lists the primary circuits that you configured.
7. Select a circuit from the list.	Site Manager sets this circuit as the local circuit.
8. Click on **OK**.	You return to the Caller Resolution Table window.
9. Click on **Done**.	You return to the Configuration Manager window.

Local Phone Number Configuration

Finally, configure each router's phone number by completing the following tasks:

Site Manager Procedure	
You do this	**System responds**
1. In the Configuration Manager window, choose **Dialup**.	The Dialup menu opens.
2. Choose **Local Phone Numbers.**	The ISDN Local Phone Lines window opens.
3. Click on **Local Phones**.	The ISDN Local Phone Numbers window opens.
4. Click on **Add**.	The Phone Number window opens.
5. Set the **Directory Number** parameter as follows: • Router 1: **4364444** • Router 2: **4363333**	
6. Set the **SPID** parameter as follows: • Router 1: **50843644440000** • Router 2: **50843633330000**	
7. Click on **OK**.	You return to the ISDN Local Phone Numbers window.
8. Click on **Done**.	You return to the ISDN Local Phone Lines window.
9. Click on **Done**.	You return to the Configuration Manager window.

Appendix C
BCC show Commands

Use the BCC **show** command to display configuration and statistical information about dial-on-demand and dial backup service. See *Using the Bay Command Console (BCC)* for information about **show** command syntax.

This appendix contains information about the following **show** commands:

Command	Page
show dial demand summary	C-5
show dial demand pools	C-5
show dial demand circuits general	C-7
show dial demand circuits advanced	C-7
show dial demand lines	C-8
show dial demand schedules	C-9
show dial demand in-phone-numbers	C-10
show dial demand out-phone-numbers	C-10
show dial demand caller-resolution	C-11
show dial demand pap-chap-information	C-12
show dial backup summary	C-13
show dial backup pools	C-14
show dial backup circuits	C-15
show dial backup lines	C-16
show dial backup schedules	C-17
show dial backup out-phone-numbers	C-17
show dial backup caller-resolution	C-18

(continued)

Command	Page
show dial backup pap-chap-information	C-19
show dial calls	C-21
show dial caller-resolution	C-22
show dial pap-chap-information	C-22
show dial local-phone-numbers	C-23
show modem alerts	C-24
show modem all	C-25
show modem errors	C-28
show modem sample	C-29
show modem stats	C-30

The **show** command displays information about the router's dial configuration. For example, if you enter the command:

`bcc>` **show dial backup circuits**

The router displays the following output:

```
Dial services:   Dial backup:   Circuit Information
-------------------------------------------------
 Primary       Backup                  Primary WAN
 Circuit       Pool ID  Backup Mode    Protocol
 ------------  -------  -----------    -----------
 S21               179  Initiator      ppp
 S41               175  Initiator      ppp
 MCE1-31-2         175  Receiver       ppp
 MCE1-31-3         177  Initiator      relay
 MCE1-31-4         178  Initiator      ppp
```

Online Help for show Commands

To display a list of command options for dial services, enter **show dial ?** at any BCC prompt.

To learn more about any **show** command options and its syntax, use the question mark (**?**) command as follows:

```
bcc> show dial ?
show dial <option>
     Where <option> is one of:
backup                  calls                   local-phone-numbers
caller-resolution       demand                  pap-chap-information

bcc> show dial demand ?
show dial demand <option>
     Where <option> is one of:
  caller-resolution       lines                   pools
  circuits                out-phone-numbers       schedules
  in-phone-numbers        pap-chap-information    summary

bcc> show dial demand caller-resolution ?
show dial demand caller-resolution [-caller <arg>]
```

Commands for Dial-on-Demand

The most general representation of BCC **show** syntax is as follows:

show [once] *<container>* [*<container>*] **[***<keyword>* *<argument>**] **[***<filter_flag>* *<filter_argument>***]**

The keyword **once** will cause the statistical information screen to be displayed once, and is the default if not specified.

Table C-1 lists the **show** commands for dial-on-demand:

Table C-1. Dial-on-Demand show Commands

<container 1>	**<container 2>**	**<keyword>**	**<filter_flags>**	**<filter_arguments>**
demand	<none>	summary	-pool	<*pool_id*>
		pools	-pool	<*pool_id*>
	circuits	general	-pool -circuit	<*pool_id*> <*circuit_name*>
		advanced		
	<none>	lines	-pool	<*pool_id*>
		schedules	-pool -circuit	<*pool_id*> <*circuit_name*>
		out-phone-numbers	-pool -circuit	<*pool_id*> <*circuit_name*>
		caller-resolution	-caller	<*caller_name*>
		pap-chap-information	-circuit	<*circuit_name*>

*There are no arguments for dial-on-demand **show** commands.

show dial demand summary

The **show dial demand summary** command displays general information about dial-on-demand, including demand pool IDs, demand lines, and demand circuits.

You can specify the following filter flag with this command:

-**pool** <*pool_id*> displays general information for the specified demand pool only.

The output contains the following information:

Pool ID	The ID of the pool that data is describing
Demand Circuits	Demand circuit names that are using the pool ID
Demand lines	Types of lines in the pool and each lines's interface slot on the router.

show dial demand pools

The **show dial demand pools** command displays information about all demand pools.

The following filter flag and filter argument can be used with this command:

-**pool** <*pool_id*> displays information about the specified demand pool only.

The output contains the following information:

Dial Service Information

Pool ID	The ID of the demand pool.

Demand Circuit Information

Demand Circuit Name	Circuit name.
Connection Mode	Indicates whether this router initiates or receives calls.
WAN Protocol	WAN protocol for the demand circuit.
Operational Mode	Type of demand circuit, that is, normal or standby.
Callback Mode	Role of the router in relation to its peer for callback operation.

Demand Line Information: (Serial Lines)

Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Link State	Indicates whether the link is initialized or inactive.
Media Type	Signaling type for the modem interface.
Async Baud Rate	Baud rate for the interface.
Active Circuit Name	Circuit name.

Demand Line Information: (ISDN Lines)

Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Link State	Indicates whether the link is initialized or inactive.
Channel Count	Number of B channels in the pool.
Channels in use	Number of active B channels.
Priority	Priority value assigned to the channel.

show dial demand circuits general

The **show dial demand circuits general** command provides information about all demand circuits.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows circuit information about a specific demand pool.

-circuit <*circuit_name*> shows circuit information about a specific demand circuit.

The output contains the following information:

Demand Circuit Name	Circuit name.
Pool ID	ID of the line pool.
Connection Mode	Specifies whether the router initiates or receives calls.
WAN Protocol	WAN protocol for the primary circuit.
Inactivity Timer (secs)	Number of seconds that can elapse without data activity before the router terminates the connection.
Max Up Time (min)	Maximum duration of a call for a continuous period of time.
Forced Dial	Indicates whether the router is forcing an active connection.
Forced Take Down	Indicates whether the router is forcing the termination of a connection.
Optimized Routing	Indicates whether dial-optimized routing is enabled.

show dial demand circuits advanced

The **show dial demand circuits advanced** command provides information about the standby and callback demand circuits.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows circuit information about a specified demand pool.

-circuit <*circuit_name*> shows circuit information about a specific demand circuit.

The output contains the following information:

Demand Circuit Name	Circuit name.
Pool ID	ID of the line pool.
Operational Mode	Type of demand circuit, that is, normal or standby.
Standby Failback Mode	The failback operation from the standby circuit to the primary.
Manual Standby Action	Indicates whether the operation of the standby circuit is controlled manually.
Callback Mode	The role of the router in relation to its peer for callback operation.

show dial demand lines

The **show dial demand lines** command provides information about demand lines.

You can use the following filter flag and filter argument with this command:

-pool <*pool_id*> shows circuit information about a specified demand pool.

The output contains the following information:

Line Information: (Serial)

Pool ID	The ID number of the demand pool.
Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Link WAN Type	Indicates the type of WAN interface, that is, synchronous or asynchronous.
Media Type	Signaling type for the modem interface.
Async Baud Rate	Baud rate for the interface.
Active Circuit Name	Circuit name.
Line Priority	The priority assignment of the line in the pool.

Line Information: (ISDN)

Pool ID	ID number of the demand pool.
Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Channel Count	Number of B channels in the pool.
Channels in use	Number of active B channels.
Priority	Priority value assigned to the channel.

show dial demand schedules

The **show dial demand schedules** command provides information about the availability schedules of demand circuits.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows schedule information for the demand circuit using a specified demand pool.

-circuit <*circuit_name*> shows the schedule information for a specified demand circuit.

The output contains the following information:

Demand Circuit Name	Circuit name.
Demand Pool ID	ID of the line pool.
Day(s)	Days that the demand circuit can be active.
Start Time	Time that the demand circuit activates.
End Time	Time when the demand circuit deactivates.
Availability Mode	Specifies whether the demand circuit is available within the start and end time or outside that specified interval.

show dial demand in-phone-numbers

The **show dial demand in-phone-numbers** command displays the incoming phone list numbers.

You can use the following filter flag and filter argument with this command:

-circuit *<circuit_name>* displays the incoming phone list for the specified demand circuit only.

The output contains the following information:

Incoming Phone Numbers	Incoming phone number listed in the incoming phone list.
Phone Extension	Extension of the incoming phone number.
Demand Circuit Name	Name of the demand circuit.

show dial demand out-phone-numbers

The **show dial demand out-phone-numbers** command provides information about the outgoing phone numbers that you configure.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id>* shows outgoing phone number information for demand circuits using a specified backup pool.

-circuit <*circuit_name*> shows outgoing phone number information for a specified demand circuit.

The output contains the following information:

Demand Circuit Name	Circuit name.
Outgoing Phone Number	Outgoing phone number the router dials.
Extension	The extension of the outgoing phone number.
Phone Number Type	Specifies whether the phone number is a modem (serial or asynchronous) or ISDN call.
ISDN Number Type	ISDN number type, that is, dialsync, isdn, or dialasync.
ISDN Number Plan	ISDN number plan for this circuit.
Pool ID	ID of the demand pool.

show dial demand caller-resolution

The **show dial demand caller-resolution** command displays information about caller resolution table entries configured for demand circuits.

You can use the following filter flag and filter argument with this command:

-caller <caller_*name*> displays information about caller resolution table entries for a specified caller name.

The output contains the following information:

Caller Name	Name of the remote caller.
CHAP Secret	Remote router's CHAP secret.
PAP Password	Remote router's PAP password.
Demand Circuit Name	Local circuit that the router activates when receiving a call from the remote router.
Demand Pool ID	ID of the demand pool.

show dial demand pap-chap-information

The **show dial demand pap-chap-information** command displays the PAP and CHAP information configured for demand circuits.

You can use the following filter flags and filter arguments with this command:

-circuit <*circuit_name*> shows the CHAP and PAP information for a specified demand circuit.

The output contains the following information:

Demand Circuit Name	Name of the demand circuit.
CHAP Local Name	The local router's CHAP name.
CHAP Secret	The local router's CHAP secret.
PAP ID	The local router's PAP ID.
PAP Password	The local router's PAP password.
Demand Pool ID	ID of the demand pool.

Commands for Dial Backup

Table C-2 lists all the dial backup **show** commands. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand). If you do not specify any filter flags, the router will show information for all applicable entries.

Table C-2. Dial Backup show Commands

<container>	<keyword>	<arguments>	<filter_flags>	<filter_arguments>
backup	summary	<none>	-pool	<*pool_id*>
	pools	<none>	-pool	<*pool_id*>
	circuits	<none>	-pool -circuit	<*pool_id*> <*circuit_name*>
	lines	<none>	-pool	<*pool_id*>
	schedules	<none>	-pool -circuit	<*pool_id*> <*circuit_name*>
	out-phone-numbers	<none>	-pool -circuit	<*pool-id*> <*circuit_name*>
	caller-resolution	<none>	-caller	<*caller_name*>
	pap-chap-information	<none>	-circuit	<*circuit_name*>

show dial backup summary

The **show dial backup summary** command displays general information about dial backup, including backup pool IDs, primary circuits, and backup lines.

You can use the following filter flag and filter argument with this command:

-pool <*pool_id*> shows information for the specified backup pool.

The output contains the following information:

Dial services	The dial services that the summary describes.
Pool ID	The ID of the backup pool.
Primary Circuits	Primary circuits using the pool.
Backup lines	Lines in the pool.

show dial backup pools

The **show dial backup pools** command displays information about backup pools.

You can use the following filter flag and filter argument with this command:

-pool <*pool_id*> shows the line information for a specified backup pool.

The output contains the following information:

Dial Service Information

Dial service	The dial service that the summary describes.
Pool ID	The ID of the line pool.

Primary Circuit Information

Primary Circuit Name	Circuit name.
Primary Down Time	Number, in minutes, the router allows for the primary circuit to recover before the backup circuit is activated.

Line Information: (Serial Lines)

Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Link State	Indicates whether the link is initialized or inactive.
Media Type	Signaling type for the modem interface.
Async Baud Rate	Baud rate for the interface.
Active Circuit Name	Circuit name.

Line Information: (ISDN Lines)

Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Channel Count	Number of B channels in the pool.
Channels in use	Number of active B channels.
Priority	Priority value assigned to the channel.

show dial backup circuits

The **show dial backup circuits** command provides information about the primary and backup circuits.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows circuit information for a specified backup pool.

-circuit <*circuit_name*> shows circuit information for a specified primary circuit.

The output contains the following information:

Primary Circuit	Circuit name.
Backup Pool ID	ID of the line pool.
Backup Mode	Specifies whether the router initiates or receives the calls.
Primary WAN Protocol	WAN protocol for the primary circuit.

show dial backup lines

The **show dial backup lines** command shows which lines are configured for backup pools.

You can use the following filter flag and filter argument with this command:

-pool <*pool_id*> shows the line information for a specified backup pool.

The output contains the following information:

Line Information: (Serial)

Pool ID	ID of the line pool.
Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Link WAN Type	Specifies the link type (synchronous or asynchronous) for the line.
Link State	Indicates whether the link is initialized or inactive.
Media Type	Signaling type for the modem interface.
Async Baud Rate	Baud rate for the interface.
Active Circuit Name	Circuit name of the primary circuit that uses this line. If the line is not in use, the value None is displayed.
Line Priority	The priority assignment of the line in the pool.

Line Information: (ISDN Lines)

Pool ID	ID of the line pool.
Slot/Module/Conn	The slot, module number, and the connector number where the dial interface resides.
Channel Count	Number of B channels in the pool.
Channels in use	Number of active B channels.
Priority	Priority value assigned to the channel.

show dial backup schedules

The **show dial backup schedules** command provides information about the availability schedules of backup circuits.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows the backup circuit schedule information for primary circuits using a specified backup pool.

-circuit <*circuit_name*> shows the backup circuit schedule information for a specified primary circuit.

The output contains the following information:

Primary Circuit	Circuit name.
Backup Pool ID	ID of the line pool.
Days	Days that the backup circuit can be active.
Start Time	Time that the backup circuit activates.
End Time	Time when the backup circuit deactivates.
Availability Mode	Specifies whether the backup circuit is available within the start and end time or outside that specified interval.

show dial backup out-phone-numbers

The **show dial backup out-phone-numbers** command contains information about the outgoing phone numbers that you configure.

You can use the following filter flags and filter arguments with this command:

-pool <*pool_id*> shows outgoing phone number information for primary circuits using a specified backup pool.

-circuit <*circuit_name*> *s*hows outgoing phone number information for a specified primary circuit.

The output contains the following information:

Primary Circuit Name	Circuit name.
Outgoing Phone Number	Outgoing phone number the router dials.
Extension	The extension, if any, of the outgoing phone number.
Phone Number Type	Specifies whether the phone number is a modem (serial or asynchronous) or ISDN call.
ISDN Number Type	ISDN number type of the phone number.
ISDN Number Plan	ISDN number plan of the phone number.
Backup Pool ID	ID of the backup pool.

show dial backup caller-resolution

The **show dial backup caller-resolution** command displays information about caller resolution table entries configured for dial backup.

You can use the following filter flag and filter argument with this command:

-caller <*caller_name*> displays information about caller resolution table entries for a specified caller.

The output contains the following information:

Caller Name	Name of the remote caller.
CHAP Secret	Remote router's CHAP secret.
PAP Password	Remote router's PAP password.
Circuit Name	Local circuit that the router activates when receiving a call from the remote router.
Backup Pool ID	ID of the backup pool.

show dial backup pap-chap-information

The **show dial backup pap-chap-information** command displays the PAP and CHAP information configured for primary circuits.

You can use the following filter flag and filter argument with this command:

-circuit <*circuit_name*> shows the CHAP and PAP information for a specified primary circuit.

The output contains the following information:

Circuit Name	Name of the primary circuit.
CHAP Local Name	The local router's CHAP name.
CHAP Secret	The local router's CHAP secret.
PAP ID	The local router's PAP ID.
PAP Password	The local router's PAP password.
Backup Pool ID	ID of the backup pool.

Commands for All Dial Services

The show commands in the next sections are available for dial-on-demand and dial backup. To indicate which service you want output for, you specify that service as a filter flag in the command syntax.

Table C-3 lists the show commands for all dial services. The filter flags and filter arguments are options that you can use with each keyword (also called subcommand). If you do not specify any filter flags, the router will show information for all applicable entries.

Table C-3. Dial show Commands for All Services

<container>	**<keyword>**	**<filter_flags>**	**<filter_arguments>**
calls	<none>	-backup -demand	
caller-resolution	<none>	-backup -demand -caller	<*caller_name*>
pap-chap-information	<none>	-backup -demand -circuit	<*circuit_name*>
local-phone-numbers	<none>	<none>	<none>

show dial calls

The **show dial calls** command displays information about active calls.

You can use the following filter flags with this command:

-backup displays information for dial backup service.

-demand displays information for dial-on-demand service.

The output contains the following information:

Dial Services: Calls (ISDN)

Slot	The slot on the router where the dial interface resides.
Logical Line Number	Number of the line interface for the dial circuit.
Circuit Name	Name of the dial circuit.
Called Phone No.	Phone number the router dialed for the remote destination.
Calling Phone No.	Phone number of the local router placing the call.
Duration (minutes)	Length of the call.
Configured Pool IDs	ID of the configured pools.

Dial Services: Calls (non-ISDN)

Slot/Mod/Conn	The slot on the router where the dial interface resides.
Circuit Name	Name of the dial circuit.
Configured Pool IDs	ID of the configured pools.

show dial caller-resolution

The **show dial caller-resolution command** displays information about caller name table entries.

You can use the following filter flags and filter arguments with this command:

-backup shows caller resolution information for dial backup service.

-demand shows caller resolution information for dial-on-demand service.

-caller <*caller_name*> shows caller resolution information for a specified caller.

The output contains the following information:

Caller Name	Name of the remote caller.
CHAP secret	Remote router's CHAP secret.
PAP Password	Remote router's PAP password.
Circuit Name	Local circuit that the router activates when receiving a call from the remote router.
Cct Grp. No.	Circuit group number (dial-on-demand only).
Configd Pool IDs	IDs of the configured line pools.

show dial pap-chap-information

The **show dial pap-chap-information** command displays the authentication configuration.

You can use the following filter flags and filter arguments for this command:

-backup shows PAP and CHAP information for dial backup service.

-demand shows PAP and CHAP information for dial-on-demand service.

-circuit <*circuit_name*> shows PAP and CHAP information for a specified caller.

The output contains the following information:

Circuit Name	Name of the dial circuit.
CHAP Local Name	The local router's CHAP name.
CHAP Secret	The local router's CHAP secret.
PAP ID	The local router's PAP ID.
PAP Password	The local router's PAP password.
Configd Pool IDs	ID of the line pool.

show dial local-phone-numbers

The **show dial local-phone-numbers** command displays the local phone numbers list configured for ISDN calls.

The output contains the following information:

Slot/Module/Conn	The slot, module number, and connector number where the dial interface resides.
Local Phone Number	The local router's phone number associated with the interface.
Extension	The extension of the local phone number.
Directory Number Type	The phone number type.
Directory Number Plan	The phone number plan.
Service Profile ID	Service Profile Identifier (SPID) assigned by the ISDN service provider. For service from a switch conforming to national ISDN standards.
SPID Max Retry Attempts	Maximum number of call retries allowed for the interface.

Modem Commands

Table C-4 lists the modem **show** commands. These commands apply only to the ARN.

Table C-4. Modem show Commands

<container >	**<keyword>**	**<filter_flags>**	**<filter_arguments>**
alerts	<none>	-slot	<*circuit_name*> <*slot*>
all	<none>	-slot	<*circuit_name*> <*slot*>
errors	<none>	-slot	<*circuit_name*> <*slot*>
sample	<none>	-slot -period	<*circuit_name*> <*slot*> <*period_in_seconds*>
stats	<none>	-slot	<*circuit_name*> <*slot*>

show modem alerts

The **show modem alerts** command lists the modem interfaces that are configured but not active.

You can use the following filter flag and filter argument for this command:

-slot <*slot*> shows information for a specified router slot.

The output contains the following information:

Slot/Conn	The slot and the connector number where the modem module resides.
Admin State	State of the line.
HW Address	Physical address of the line. The line driver provides this address from the address stored in the module number PROM for this connector.

(continued)

WAN Protocol	WAN protocol enabled on this interface.show dial demand schedules
Operational State	State of the line driver: up, down, init, wait, dsr wait, holdown, remote loop, lineloopbofltest, not present (enabled but not yet started). The Not Present state occurs for several reasons. For example, the modem module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Errors	Number of errors for a specific circuit.
MTU	Maximum transmission unit, which is the largest frame the router transmits or receives across this interface.

show modem all

The **show modem all** command lists detailed configuration and statistical information about the modem interface.

You can use the following filter flag and filter argument for this command:

-slot <*slot*> shows information for a specified router slot.

The output contains the following information:

Slot/Connector	The slot and connector number where the modem module resides.
Admin State	State of the line.
Operational State	State of the line driver: up, down, init, wait, dsr wait, holdown, remote loop, lineloopbofltest, not present not present (enabled but not yet started). The Not Present state occurs for several reasons. For example, the modem module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.

(continued)

MAC Address	Media access control (MAC) address: the physical address of the line. The line driver fills in this address from the 48-bit address stored in the link module number PROM for this connector.
MTU	Maximum transmission unit (MTU) size, that is, the buffer size and the largest frame that can be transmitted or received across the modem interface. The range is 3 to 4608.
WAN Protocol	WAN protocol enabled on the interface.
Local Address	The 1-byte local HDLC address of the interface.
Remote Address	The 1-byte remote HDLC address of the interface.
BOFL	State (enabled or disabled) of the transmission of proprietary BofL messages over a point-to-point connection between the local router and a remote peer.
BOFL TMO	BofL Timeout -- the time between transmissions of BofL messages from this interface.
Receive Bytes	Number of octets received without error.
Receive Frames	Number of frames received without error.
Receive Average Packet	Average number of packets received without error.
Transmit Bytes	Number of octets transmitted without error.
Transmit Frames	Number of frames transmitted without error.
Transmit Average Packet	Average number of packets transmitted without error.
Total Errors/Receive	Total number of errors received.
Total Errors/Transmit	Total number of errors transmitted.
Number of Buffers/Receive	Number of packets received without error.
Number of Buffers/Transmit	Number of packets transmitted without error.

Receive Errors

Bad Frames	Number of bad receive frames, caused by frame check sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames, that is, frames shorter than the normal size, received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceeded the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

Underflow frames	Number of retransmission underflow errors. These errors occur when the device's FIFO buffer empties before the device obtains the next DMA request.

System Errors

Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds 5, call your customer service representative.

show modem errors

The **show modem errors** command displays receive, transmit, and system errors for the interface.

You can use the following filter flag and filter argument for this command:

-slot <*slot*> shows information for a specified router slot.

The output contains the following information:

Receive Errors

Slot/Conn	The slot and the connector number where the modem module resides.
Bad Frames	Number of bad receive frames, caused by frame check sequence (FCS) errors or nonoctet aligned errors.
Runt Frames	Number of runt frames, that is, frames shorter than the normal size, received on this line.
Frame Rejects	Number of frame reject errors received on this line.
Frames Too Long	Number of frames received on this line that exceeded the MTU.
Overflow Frames	Number of overflow frames received on this line in which the device's FIFO buffer overflowed before obtaining the next DMA cycle. No buffer resources are available.

Transmit Errors

Slot/Conn	The slot and the connector number where the modem module resides.
Underflow Frames	Number of retransmission underflow errors. These errors occur when the router's FIFO buffer empties before the router obtains the next DMA request.

System Errors

Slot/Conn	The slot and the connector number where the modem module resides.
Receive Rejects	Number of reject frames received.
Transmit Rejects	Number of reject frames transmitted.
T1 Timeouts	Number of T1 timeouts detected. The T1 timer is the link retransmission timer. Link control frames are retransmitted when the T1 expires. This timer tracks the number of timeouts.
Memory Errors	Number of memory errors detected. A memory error occurs when the DMA cycle expires without obtaining the bus within 26 ms. Memory errors may indicate faulty hardware. If this count exceeds 5, call your customer service representative.

show modem sample

The **show modem sample** command displays data sampled over a period of 10 seconds across modem lines.

You can use the following filter flags and filter arguments for this command:

-slot <*slot*> shows information for a specified router slot.

-**period** <*period_in_seconds*> shows the data sampled for a specified number of seconds. Use this argument to change the length of time data is sampled.

The output contains the following information:

Slot/Conn	The slot and the connector number where the modem module resides.
Input Rate (bytes/sec)	Number of octets received without error.
Input Rate (pkts/sec)	Number of packets received without error.
Output Rate (bytes/sec)	Number of octets transmitted without error.
Output Rate (pkts/sec)	Number of packets transmitted without error.
Input Lack of Resource	Number of packets received and discarded because of lack of resources, for example, buffers.
Output Lack of Resource	Number of transmit packets discarded because of lack of resources, for example, buffers.

show modem stats

The **show modem stats** command displays input and output statistical information for the V.34 modem module.

You can use the following filter flags and filter arguments for this command:

-slot <*slot_number*> shows information for a specified router slot.

The output contains the following information:

Slot/Conn	The slot and the connector number where the modem module resides.
Operational State	State of the line driver: up, down, init, wait, dsr wait, holdown, remote loop, lineloopbofltest, not present (enabled but not yet started) The Not Present state occurs for several reasons. For example, the modem module may not be physically present in the chassis; the software may be booting and has not yet initialized the driver software; the slot may be running diagnostics; or there may be a problem with the configuration.
Receive Errors:	Number of frames received with errors.
Transmit Errors	Number of transmit frames with errors.
Number of Buffers: Receive Transmit	 Number of buffers received without errors. Number of buffers transmitted without errors.
Receive Bytes	Number of octets received without errors.
Receive Frames	Number of frames received without errors.
Recv Avg Pkt:	Number of bytes received without errors.
Transmit Bytes	Number of octets transmitted without errors.
Transmit Frames	Number of frames transmitted without errors.
Transmit Avg Pkt	Number of bytes transmitted without errors.

Appendix D
Ordering ISDN Lines in the United States

This appendix provides information about ordering ISDN lines in the United States.

Ordering BRI Lines

When ordering ISDN BRI lines for use in the United States, note the following:

- Configure the B1 and B2 channels for data only.
- Configure the D channel for signaling only.

Table D-1 lists the parameters to set for the AT&T 5ESS switch. Table D-2 lists the parameters to set for the Nortel Networks DMS-100 switch. Your telephone company may ask you to provide this information when you order your BRI lines.

Table D-1. BRI Parameters for the AT&T 5ESS Switch

Parameter	Value	Notes
Terminal Type	A	
Number of CSD	2	
Number of CSV	0 or 1	1 if an ISDN phone was connected to the S/T bus
Number of Call Appearances	1	
Display is Y/N	No	
Ringing/Idle Call Appearances	Idle	Default for terminal type A
Autohold is Y/N	No	Default for terminal type A
Onetouch is Y/N	No	Default for terminal type A

Table D-2. BRI Parameters for the Nortel Networks DMS-100 Switch

Parameter	Value	Notes
Signaling	Functional	
Protocol Version	1 or 2	1 is NT1 (Custom) 2 is NI-1 (National ISDN-1)
TEI Assignment	Dynamic	
Maximum # of Keys	3	Specify any number greater than or equal to 1
Release Key is N or a Key Number	No	Not relevant for proper operation
Ring Indicator is Y/N	No	Not relevant for proper operation
EKTS is Y/N	No	

Ordering PRI Lines

When ordering ISDN PRI lines for use in the United States, note the following:

- The switch must be a DMS-100, AT&T 5ESS, or AT&T 4ESS switch.
- Configure all 23 B channels for Circuit Switched Data (CSD).
- Configure the D channel for signaling only.
- You cannot run the National ISDN-2 (NI-2) protocol.

Appendix E
AT Initialization Commands for the ARN

Table E-1 lists the AT commands used by the ARN with the internal modem adapter module. Because your modem may use a different set of commands, consult the manual for your modem.

Table E-1. Summary of AT Modem Initialization Commands

Command	Function
A/	Reexecute command.
A	Go off-hook and attempt to answer a call.
B0	Select V.22 connection at 1200 b/s.
B1	Select Bell 212A connection at 1200 b/s.
C1	Return OK message.
Dn	Dial modifier.
E0	Turn off command echo.
E1	Turn on command echo.
F0	Select auto-detect mode, equivalent to N1 (RC144).
F1	Select V.21 or Bell 103 (RC144).
F2	Reserved (RC144).
F3	Select V.23 line modulation (RC144).
F4	Select V.22 or Bell 212A 1200 b/s line speed (RC144).
F5	Select V.22bis line modulation (RC144).
F6	Select V.32bis or V.32 4800 line modulation (RC144).
F7	Select V.32bis 7200 line modulation (RC144).
F8	Select V.32bis or V.32 9600 line modulation (RC144).

(continued)

Table E-1. Summary of AT Modem Initialization Commands *(continued)*

Command	Function
F9	Select V.32bis 12000 line modulation (RC144).
F10	Select V.32bis 14400 line modulation (RC144).
H0	Initiate a hang-up sequence.
H1	If on-hook, go off-hook and enter command mode.
I0	Report product code.
I1	Report precomputed checksum.
I2	Report OK.
I3	Report firmware revision, model, and interface type.
I4	Report response programmed by an OEM.
I5	Report the country code parameter.
I6	Report modem data pump model and code revision.
I7	Report the DAA code (W-class models only).
L0	Set low speaker volume.
L1	Set low speaker volume.
L2	Set medium speaker volume.
L3	Set high speaker volume.
M0	Turn speaker off.
M1	Turn speaker on during handshaking and off while receiving carrier.
M2	Turn speaker on during handshaking and while receiving carrier.
M3	Turn speaker off during dialing and receiving carrier, and turn speaker on during answering.
N0	Turn off automode detection.
N1	Turn on automode detection.
O0	Go online.
O1	Go online and initiate a retrain sequence.
P	Force pulse dialing.
Q0	Allow result codes to DTE.
Q1	Inhibit result codes to DTE.
Sn	Select S-Register as default.
Sn?	Return the value of S-Register *n*

(continued)

Table E-1. Summary of AT Modem Initialization Commands *(continued)*

Command	Function
=v	Set default S-Register to value *v*.
?	Return the value of default S-Register.
T	Force DTMF dialing.
V0	Report short form (terse) result codes.
V1	Report long form (verbose) result codes.
W0	Report DTE speed in EC mode.
W1	Report line speed, EC protocol, and DTE speed.
W2	Report DCE speed in EC mode.
X0	Report basic call progress result codes. For example, OK, CONNECT, RING, NO CARRIER (also, for busy, if enabled, and dial tone not detected), NO ANSWER, and ERROR.
X1	Report basic call progress result codes and connection speeds. For example, OK, CONNECT, RING, NO CARRIER (also, for busy, if enabled, and dial tone not detected), NO ANSWER, CONNECT XXXX, and ERROR.
X2	Report basic call progress result codes and connection speeds. For example, OK, CONNECT, RING, NO CARRIER (also, for busy, if enabled, and dial tone not detected), NO ANSWER, CONNECT XXXX, and ERROR.
X3	Report basic call progress result codes and connection rate. For example, OK, CONNECT, RING, NO CARRIER, NO ANSWER, CONNECT XXXX, and ERROR.
X4	Report all call progress result codes and connection rate. For example, OK, CONNECT, RING, NO CARRIER, NO ANSWER, CONNECT XXXX, BUSY, NO DIAL TONE, and ERROR.
Y0	Disable long space disconnect before on-hook.
Y1	Enable long space disconnect before on-hook.
Z0	Restore stored profile 0 after warm reset.
Z1	Restore stored profile 1 after warm reset.
&C0	Force RLSD active regardless of the carrier state.
&C1	Allow RLSD to follow the carrier state.
&D0	Interpret DTR ON-to-OFF transition per &Qn:.
&Q0, &Q5, &Q6	The modem ignores DTR.

(continued)

Table E-1. Summary of AT Modem Initialization Commands *(continued)*

Command	Function
&Q1, &Q4	The modem hangs up.
&Q2, &Q3	The modem hangs up.
&D1	Interpret DTR ON-to-OFF transition per &Qn:.
&Q0, &Q1, &Q4, &Q5, &Q6	Asynchronous escape.
&Q2, &Q3	The modem hangs up.
&D2	Interpret DTR ON-to-OFF transition per &Qn:.
&Q0 through &Q6	The modem hangs up.
&D3	Interpret DTR ON-to-OFF transition per &Qn:.
&Q0, &Q1, &Q4, &Q5, &Q6	The modem performs soft reset.
&Q2, &Q3	The modem hangs up.
&F0	Restore factory configuration 0.
&F1	Restore factory configuration 1.
&G0	Disable guard tone.
&G1	Disable guard tone.
&G2	Enable 1800 Hz guard tone.
&J0	Set S-Register response only for compatibility.
&J1	Set S-Register response only for compatibility.
&K0	Disable DTE/DCE flow control.
&K3	Enable RTS/CTS DTE/DCE flow control.
&K4	Enable XON/XOFF DTE/DCE flow control.
&K5	Enable transparent XON/XOFF flow control.
&K6	Enable both RTS/CTS and XON/XOFF flow control.
&L0	Select dial-up line operation.
&M0	Select direct asynchronous mode.
&M1	Select sync connect with async off-line command mode. *
&M2	Select sync connect with async off-line command mode and enable DTR dialing of directory zero. *
&M3	Select sync connect with async off-line command mode and enable DTR to act as Talk/Data switch.

(continued)

Table E-1. Summary of AT Modem Initialization Commands *(continued)*

Command	Function
&P0	Set 10 p/s pulse dial with 39%/61% make/break.
&P1	Set 10 p/s pulse dial with 33%/67% make/break.
&P2	Set 20 p/s pulse dial with 39%/61% make/break.
&P3	Set 20 p/s pulse dial with 33%/67% make/break.
&Q0	Select direct asynchronous mode.
&Q1	Select sync connect with async off-line command mode. *
&Q2	Select sync connect with async off-line command mode and enable DTR dialing of directory zero. *
&Q3	Select sync connect with async off-line command mode and enable DTR to act as Talk/Data switch. *
&Q4	Select Hayes AutoSync mode.
&Q5	Modem negotiates an error corrected link.
&Q6	Select asynchronous operation in normal mode.
&R0	CTS tracks RTS (async) or acts per V.25 (sync).
&R1	CTS is always active.
&S0	DSR is always active.
&S1	DSR acts per V.25.
&T0	Terminate any test in progress.
&T1	Initiate local analog loopback.
&T2	Returns ERROR result code.
&T3	Initiate local digital loopback.
&T4	Allow remote digital loopback.
&T5	Disallow remote digital loopback request.
&T6	Request an RDL without self-test.
&T7	Request an RDL with self-test.
&T8	Initiate local analog loop with self-test.
&V	Display current configurations.
&W0	Store the active profile in NVRAM profile 0.
&W1	Store the active profile in NVRAM profile 1.
&X0	Select internal timing for the transmit clock.

(continued)

Table E-1. Summary of AT Modem Initialization Commands *(continued)*

Command	Function
&X1	Select external timing for the transmit clock.
&X2	Select slave receive timing for the transmit clock.
&Y0	Recall stored profile 0 upon power up.
&Y1	Recall stored profile 1 upon power up.
&Zn=x	Store dial string x (to 34) to location n (0 to 3).
%E0	Disable line quality monitor and auto retrain.
%E1	Enable line quality monitor and auto retrain.
%E2	Enable line quality monitor and fallback/fall forward.
%L	Return received line signal level.
%Q	Report the line signal quality.
+MS	Select modulation.
+H0	Disable RPI.
+H1	Enable RPI and set DTE speed to 19200 b/s.
+H2	Enable RPI and set DTE speed to 38400 b/s.
+H3	Enable RPI and set DTE speed to 57600 b/s.
+H11	Enable RPI+ mode.
-SDR=0	Disable Distinctive Ring.
-SDR=1	Enable Distinctive Ring Type 1.
-SDR=2	Enable Distinctive Ring Type 2.
-SDR=3	Enable Distinctive Ring Type 1 and 2.
-SDR=4	Enable Distinctive Ring Type 3.
-SDR=5	Enable Distinctive Ring Type 1 and 3.
-SDR=6	Enable Distinctive Ring Type 2 and 3.
-SDR=7	Enable Distinctive Ring Type 1, 2, and 3.
-SSE=0	Disable DSVD.
-SSE=1	Enable DSVD.

* Serial interface operation only.

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